

# RESEARCH ARTICLE

## MUSCLE TONICITY OF CHILDREN WITH SPASTIC CEREBRAL PALSY: HOW EFFECTIVE IS SWEDISH MASSAGE?

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### Abstract

#### Objective

Massage therapy is one of the most widely used complementary and alternative medicine therapies for children. This study was conducted to determine the effect of Swedish massage on the muscle tonicity of children with spastic cerebral palsy (CP).

#### Materials & Methods

This study was a single blind clinical trial conducted on forty children with spastic CP, recruited from clinics of the University of Social Welfare & Rehabilitation Sciences. They were randomly assigned to intervention and control groups. Routine occupational therapy techniques were performed during a 3 month-period in both groups, while the intervention group also received Swedish massage for 30 minutes before every rehabilitation session. Muscle tonicity was evaluated at the beginning of the study and 3 months later using the Modified Ashworth Scale.

#### Results

The average ages of children in the intervention (n=13) and control (n=14) groups were 49.5 and 42.1 months respectively. Although after intervention, tonicity of upper and lower limbs, trunk and neck in the intervention group in comparison with controls had no significant differences, there were statistically significant differences in reduction rate of tonicity in upper limbs and trunk between the two groups (P <0.05).

#### Conclusion

Massage therapy is not a panacea for improvement of spasticity in children with CP but the encouraging results of other studies on children with CP indicate that further studies are needed for more definite results.

**Key Words:** Spastic cerebral palsy , Muscle tone , Swedish massage , Children.

### Introduction

Massage therapy (MT) is one of the most widely used complementary and alternative medicine (CAM) therapies, with current data indicating that parents are increasingly availing of CAM therapies, including MT, for their children. One study found that 33% of parents reported using CAM for their child within the past year, with MT being one of the most popular therapies(1-3).

Complementary medicine such as massage therapy has been used in treatment of pediatric neurodevelopmental disorders. In one study the frequency and type of CAM therapies used by families of 376 children with special health care needs (like cerebral palsy patients) were assessed. In general, this population of children used CAM at

moderately high rates, with “healing prayers” (40%) and “massage” (38%) being used more frequently than other CAM therapies(4).

To assess patterns of CAM usage in families of children with cerebral palsy (CP), a university medical center in Ann Arbor, MI, USA as part of a descriptive survey recruited 213 families with a CP child, aged between 0 to 18 years, and found that 56% used one or more CAM techniques; massage therapy (25%) and aquatherapy (25%) were the most common(5).

Very limited studies reporting the effect of massage on muscle tone in children with spastic cerebral palsy, especially from Iran are available. Hence our incentive to conduct a study measuring/assessing the effect of adding Swedish massage to occupational therapy on muscle tonicity in children with spastic cerebral palsy and to develop strategies that would help not only therapists to work with CP children, but considering the simplicity of the method, to encourage parents to do so.

### Material & Methods

Following ethical approval from the related ethics committee of the University of Social Welfare and Rehabilitation Sciences (USWR), a single blind clinical trial study was conducted in 2005, at the Saba Developmental Disorders Center affiliated to the USWR, Tehran, Iran. Inclusion criteria were age between 1-7 years, mild to moderate spastic cerebral palsy, and parents cooperation. Exclusion criteria were severe mental retardation (IQ<40), convulsions, or any other disabilities such as blindness and deafness or genetic disabilities like Down’s syndrome. Forty subjects were diagnosed as CP spastics, by a pediatrician during the study after ruling out any progressive diseases of central nervous system including degenerative diseases, spinal cord tumors, or muscular dystrophy. All parents received documented information about the aims and plans of the research, and were asked to sign consent forms; those not willing to participate would be provided with services as usual. The subjects were randomly assigned to intervention and control groups.

We focused on forms of MT that are concordant with the traditional Swedish styles of massage; Swedish massage uses five main strokes to stimulate the circulation of blood through the body; petrissage (kneading), effleurage

(stroking), friction, tapotement (tapping) and vibration. For the purposes of this study, MT is performed by the manual manipulation of soft tissue by a person other than the recipient. The intervention group was given Swedish massage for thirty minutes, three times a week for three months by a trained occupational therapist who did not aware of randomization. Intervention and control groups were received routine occupational therapy (Rood and Bobat techniques) for three months. Both groups were assessed before treatment and about three months later (one week after the last MT session).

Using the Modified Ashworth Scale(6), muscle tonicity of four limbs, and the trunk and neck, were assessed, by an occupational therapist, unaware of the randomization; the scale measures muscle tone in 6 grades (0, 1, 1+, 2, 3, and 4). Grade 0 shows normal muscle tone, while grade 4 reveals/demonstrates spasticity in flexion or extension. Assessment results of muscle tone assessment with this scale were recorded in a coded/graded check list.

Data was obtained by physical examination, direct observation and assessment of subjects, based on check lists including information on demographic characteristics and muscle tonicity. According to distribution of variables, parametric (t test, and paired t test) and non-parametric (Mann Whitney, and Wilcoxon) tests were used and data were analyzed using SPSS statistical software (11<sup>th</sup> version).

### Results

Seven patients were lost in the intervention group and six in the control group, leaving eventually thirteen and fourteen subjects remained in intervention and control groups respectively; average age in these groups was 49.5±15.7 and 42.1±11.8 months respectively (P = 0.181). Of the intervention group 84.6% and of controls, 35.7% were male. No statistically significant differences were observed in muscle tone before intervention in the two groups (P> 0.05) (Table 1). Table 2 shows the spasticity after intervention in two groups; again no statistically significant differences (P> 0.05) were seen. Table 3 shows the reduction of spasticity (before and after intervention differences) in two groups, showing statistically significant differences in spasticity in upper limbs and trunk between the two groups (P<0.05), before and after intervention.

**Table 1:** Status of muscle tonicity before intervention in the two groups.

	Intervention			Control			P
	Mean	SD	Median	Mean	SD	Median	
Upper limbs	2.36	0.83	2.25	1.84	0.98	1.50	0.076
Lower limbs	2.98	1.08	3.25	2.53	0.86	2.63	0.076
Trunk	2.00	0.91	2.00	1.86	1.41	2.00	0.756
Neck	1.46	0.66	1.00	2.07	1.73	2.50	0.458

**Table 2:** Status of muscle tonicity after intervention in the two groups.

	Intervention			Control			P
	Mean	SD	Median	Mean	SD	Median	
Upper limbs	1.59	0.74	1.50	1.57	1.06	1.38	0.550
Lower limbs	2.38	1.07	2.25	2.29	0.95	2.25	0.685
Trunk	1.31	0.48	1.00	1.86	1.41	2.00	0.325
Neck	1.00	0.58	1.00	1.86	1.51	2.00	0.185

**Table 3:** Reduction of muscle tonicity (before and after intervention differences) in the two groups.

	Intervention			Control			P
	Mean	SD	Median	Mean	SD	Median	
Upper limbs	0.77	0.72	0.50	0.27	0.31	0.19	0.033
Lower limbs	0.58	0.44	0.50	0.25	0.26	0.19	0.060
Trunk	0.69	0.63	1.00	0.00	0.00	0.00	0.006
Neck	0.46	0.52	0.00	0.21	0.43	0.00	0.280

**Discussion**

Based on the results of this study, although tonicity of upper and lower limbs, trunk and neck in intervention group in comparison with control group revealed no differences after intervention, statistically significant differences between the two groups, there were statistically significant differences ( $P < 0.05$ ) in before and after intervention differences in the reduction rate of tonicity in upper limbs and trunk between the two

groups.

According to Beider, MT effects can be divided into single-dose and multiple-dose. Single-dose effects include MT effects on psychological or physiological states that are transient in nature and hence might reasonably be influenced by a single session of MT. Multiple-dose effects are restricted to MT effects on variables considered to be more enduring, or likely to

be influenced only by a series of MT sessions over a period of time, as opposed to the single dose. In this study similar to Beider's study<sup>7</sup> we used the multiple-dose to avail of its ongoing effects.

Beider also mentions that the potential benefits of MT can be further classified according to whether they are primarily affective, physiological or behavioral in nature. Affective refers to effects most closely associated with the recipients' feelings and emotions. Physiological effects are those concerned with recipients' vital organismic processes including muscle tone. Behavioral effects are those related to the recipients' observable responses to their environment<sup>(7)</sup>. In this study, the subjects benefitted from the physiological effects of MT.

A study conducted in the University of Glasgow investigated the effect of massage on the mechanical behavior of muscles in adolescents with spastic diplegia, and found that after massage, although the range of movement was not consistently increased, but, on average, greater force was needed to stretch the muscle than before massage; they suggested that massage resets sarcomere lengths which, in turn, correct thixotropic effects<sup>(8)</sup>.

In some studies massage combined with other techniques has been used to treat children with cerebral palsy. In a Chinese study of 140 CP children, a combined treatment package based on traditional Chinese medicine (including massage), western medicine and rehabilitation techniques and family therapy was adopted. The majority of CP patients improved greatly in motor and social adaptation capacities after treatment ( $P < 0.01$ ), showing this combined therapy method to be an effective and practical treatment strategy for CP children in China<sup>(9)</sup>.

One of the methods used in combination with rehabilitation is increasing touch between parents and children with a range of disabilities, including CP, through massage; a study from Conventory University, UK, assessing the method concluded that it may be of clinical benefit. Therapists taught 42 parents simple massage techniques during one-hour weekly sessions for eight weeks. Parents reported improvements in children's muscle tone, joint mobility, sleep patterns,

bowel movements and response to other forms of therapy, e.g. physiotherapy<sup>(10)</sup>.

Two recent studies assessed the effect of MT on muscle tone; one study provided MT for CP children, 30 min of MT, twice weekly, for 12 weeks; they were assessed for changes in spasticity, motor functioning, facial expressions and limb activity. The other study provided 30 min of MT twice weekly, for 8 weeks for children with Down's syndrome, and evaluated the children's development, and fine and gross motor functioning. There is modest support that MT improves muscle tone. It must be mentioned that because these results come from a newly developed measure, the validity of the measure is not yet well-established<sup>(8,11)</sup>.

Some limitations of this study were first, the drop-out rate primarily affected the intervention group; this was due to CP complications and transport problems, especially for patients coming from other vicinities. Second, it was very difficult to keep the patients motivated for regular visits during the 3 months.

In conclusion, the present research indicates that MT is not a panacea for improvement of muscle tone in children with CP, but the encouraging results of other studies conducted on CP children indicate that further studies are required to clarify the issue. Considering that parents continue to explore and utilize all the health care options for their children, it is essential that we continue to study the benefits of MT for children with CP.

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