

# Effects of Thai Massage on Spasticity in Young People with Cerebral Palsy

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**Objective:** To determine the effects of Thai massage on muscle spasticity in young people with cerebral palsy.

**Material and Method:** Young people with spastic diplegia, aged 6-18 years old, were recruited from the Srisungwan School in Khon Kaen Province. Spasticity of right quadriceps femoris muscles was measured using Modified Ashworth Scale (MAS) at pre- and immediately post 30-minute session of Thai massage. Thai massage was applied on the lower back and lower limbs. Wilcoxon Signed Ranks test was used to compare the outcome between pre- and post treatment.

**Results:** Seventeen participants with spastic diplegia aged 13.71±3.62 years old participated. A significant difference of MAS was observed between pre- and post treatment (1+, 1; p<0.01). No adverse events were reported.

**Conclusion:** Thai massage decreased muscle spasticity and is suggested to be an alternative treatment for reducing spasticity in young people with cerebral palsy.

**Keywords:** Thai massage, Spasticity, Cerebral palsy, Diplegia, Modified ashworth scale

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Cerebral palsy is a neurological disorder found in children, which affects motor functions of the brain. Although the disorder is non-progressive in nature, muscle spasticity is the main problem that always results in muscle shortening, limited range of motion, joint stiffness, joint deformity, functional limitation and poor ADL<sup>(1,2)</sup>.

Traditional Thai massage (TTM) is an alternative treatment that has been used to promote health as well as therapy for body and mind. Its effects are well known for enhancing muscle relaxation, reducing muscle tension, and improving joint flexibility<sup>(3,4)</sup>. Thanakiatpinyo et al (2014) reported that a TTM and physical therapy program may relieve spasticity, increase functional ability, and improve quality of life after 6 weeks of stroke. However only TTM can decrease anxiety and depression scores<sup>(5)</sup>.

TTM itself is a form of deep massage with brief sustained pressure on the TTM main meridian

lines (the sen sib) that always involve tight muscles of the lower back and limbs along with passive stretching<sup>(6)</sup>. A massager uses the thumb, palms or elbow to control the mechanical pressure applied during massage, applying pressure directly on the “Sen Sib”, and focusing the pressure on specific points on these lines<sup>(6)</sup>. Pressure point massage along the “Sen Sib” is believed to release blocked energy, and increase awareness and vitality, while gently stretching the joints and muscles to relieve tension, enhance flexibility, and induce a deep state of tranquility<sup>(7)</sup>. However, TTM effects have not been reported in children with cerebral palsy. The purpose was to determine the effect of Thai massage on muscle spasticity in young people with cerebral palsy.

## Material and Method

### Design and setting

A prospective, assessor-blinded randomized clinical trial was employed. The protocol was approved by the ethics committee of Khon Kaen University (HE522340).

### Participants

Seventeen participants with spastic diplegia

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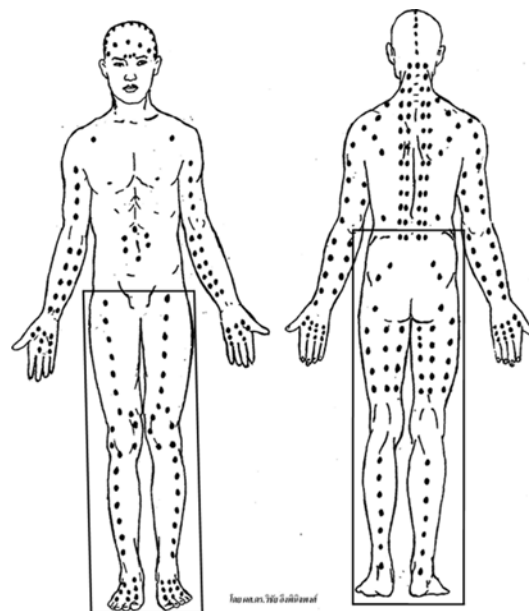
aged 6-18 years old were recruited from Srisungwan School in Khon Kaen Province. Their parents and the principal of the school gave consent for them to participate. Baseline clinical characteristics such as age, sex and Gross Motor Function Classification System (GMFCS) were reported. The inclusion criteria consisted of (1) spastic diplegia (spasticity of lower extremities more than upper extremities) (2) GMFCS level I to III, (3) age 6-18 years, (4) Modified Ashworth Scale (MAS) level 1-4, (5) normal tactile sensation, no skin abrasion, no skin infections and able to communicate. The definitions of GMFCS are described below. For level I, children can walk indoors and outdoors and climb stairs without using hands for support, can perform usual activities such as running and jumping, and have decreased speed, balance and coordination. For level II, children have the ability to walk indoors and outdoors and climb stairs with a railing, have difficulty with uneven surfaces, inclines or in crowds, and have only minimal ability to run or jump. For level III, children can walk with assisting mobility devices indoors and outdoors on level surfaces, may be able to climb stairs using a railing, may propel a manual wheelchair, and may require assistance for long distances or uneven surfaces<sup>(8)</sup>.

### Treatment

The pressing technique was employed in TTM. A certified Thai massager applied thumb pressure by gently and gradually increasing the pressure with no pain among the participants for each point along the “Sen Sib”, as shown in Fig. 1. Sen Sib are imaginary lines along postural muscles of the body; these muscle are proved to be tightened and exhibit myofascial pain syndrome<sup>(9)</sup>. For each point, thumb pressure was applied until the participants reported comfortable feeling. Pressure was maintained for 5-10 seconds before it was released and applied to the next point along the lines<sup>(10)</sup>. This protocol on lower back and both legs was repeated twice for each line. At the end of massage on each body segment, the massager applied gentle passive stretching twice for the affected muscles and joints<sup>(9,11)</sup>, and overall massage session took 30 minutes.

### Outcome measures

The participants laid on their left side while an assessor tested resistance to passive movement about the right knee joint (quadriceps femoris muscle; 3 times) with varying speed of movement, then recorded the category indicating resistance according to the



**Fig. 1** Main meridian lines (the Sen Sib) of Traditional Thai Massage: the dots in boxes represent locations of massage.

MAS classification described below. A score of 0 revealed no increase in muscle tone while a score of 1 showed slight increase in muscle tone, manifested by a catch and release or by minimal resistance at the end of the range of motion when the affected part(s) was moved in flexion or extension. Further, a score 1+ indicated slight increase in muscle tone, manifested by a catch, followed by minimal resistance throughout the remainder (less than half) of the ROM (range of movement). A score of 2 revealed more marked increase in muscle tone through most of the ROM, but the affected part(s) could be moved easily. A score of 3 showed considerable increase in passive muscle tone, movement difficult and a score of 4 indicated the affected part(s) to be rigid in flexion or extension<sup>(12,13)</sup>. The MAS has been reported to have good intra-rater reliability ( $ICC_{s(3,1)} = 0.80-0.85$ ) and moderate to good inter-rater reliability ( $ICC = 0.58-0.81$ ) for elbow flexor muscles<sup>(14,15)</sup>. In the present study, the assessor (KS) reported good intra-rater reliability ( $ICC_{s(2,1)} = 0.80-0.85$ ). The muscle spasticity was measured using MAS before and immediately after a 30-minute session of TTM to the right lower limbs of the participants by a certified Thai masseur (NS).

### Statistical analysis

Baseline characteristics including age, sex and

GMFCS were expressed as percentage, mean and standard deviation (SD). Wilcoxon Signed Ranks Test was used to compare the outcome between pre- and post treatment.

## Results

Baseline clinical characteristics are shown in Table 1. Participants had an average age of 13.71±3.62 (9 males, 7-18 years and 8 females, 8-17 years). GMFCS levels I, II and III comprised 8 (47%), 4 (23.53%) and 5 (29.41%), respectively. Outcomes measured during pre- and post treatment significantly differed as shown in Table 2 and Fig. 2. The effect of Thai massage to reduce

spasticity showed the median scores of MAS, pre- and post intervention (1+ and 1, respectively,  $p < 0.01$ ) significantly differed.

## Discussion

To our knowledge, this is the first study to evaluate the therapeutic effect of Thai massage on altering spasticity in people with cerebral palsy. The finding of this study suggested that TTM may reduce spasticity of the lower limb muscles in young people with cerebral palsy. The decreased spasticity resulting from TTM may be explained by the relaxation effect of touch and the activation of the golgi tendon organ resulting from brief and sustained muscle stretching while applying thumb pressure massage<sup>(9)</sup>. Moreover, Butttagat et al (2011) reported that TTM could decrease anxiety and promote relaxation in patients with back muscle pain<sup>(16)</sup>. Macgregor et al (2007) found that massage may affect the mechanical behavior of muscles in adolescents with spastic diplegia. Participants in their study who had GMFCS levels I and II demonstrated sustained improvements in overall score of GMFMS-66 (Gross Motor Function Measure 66)<sup>(17)</sup>. Delaney et al (2002) proposed that the decrease in muscle tension may stem from an increase in relaxation response and an overall reduction in the defense-arousal response<sup>(18)</sup>.

In terms of the safe use of TTM in these patients, we did not find any adverse effects after massage. This could be due to the gentle technique of TTM over a relatively short period (30 minutes) employed in this study. All patients favored this type of massage since they felt good immediately and one day after the session of Thai massage.

**Table 1.** Baseline clinical characteristics

Characteristics	Number (%)	Mean ± SD
Age (years)		13.71±3.62
Sex		
Male	9 (53)	
Female	8 (47)	
GMFCS		
I	8 (47)	
II	4 (24)	
III	5 (29)	
Severity of spasticity		
Mild (MAS 1 and 1+)	14 (82)	
Moderate (MAS 2)	2 (12)	
Severe (MAS 3 and 4)	1 (6)	

GMFCS = Gross Motor Function Classification System; MAS = Modified Ashworth Scale

**Table 2.** Comparison of the outcome measure between pre- and post massage (quadriceps femoris)

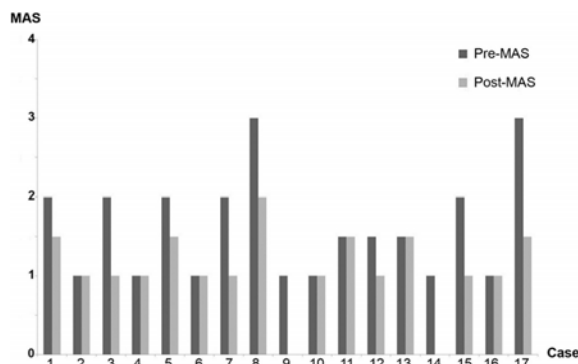
Muscle Tone		Median	<i>p</i> -value
Pre-MAS	Post-MAS		
1+	1	1	0.004*

\**p*-value < 0.05

Pre-MAS = Pre-Modified Ashworth Scale; Post-MAS = Post-Modified Ashworth Scale.

1+ = Slight increase in muscle tone, manifested by a catch, followed by minimal resistance throughout the remainder (less than one half) of the range of movement.

1 = Slight increase in muscle tone, manifested by a catch and release or minimal resistance at the end of the range of motion when the affected part(s) is(are) moved in flexion or extension



**Fig. 2** Comparison of the outcome measure between pre- and post-massage.

Pre-MAS = Pre-Modified Ashworth Scale; Post-MAS = Post-Modified Ashworth Scale

Limitations of the present study were that it employed a small sample size and had no control group. Further studies among a larger sample size including randomized and controlled trials are needed. Because spastic cerebral palsy involves impairments and functional limitations, measurements such as Time Up and Go (TUG) and 1-minute walk test (1MWT) should be further investigated.

### Conclusion

The present results demonstrated that Thai massage might decrease muscle spasticity among young people with cerebral palsy. It is suggested that Thai massage could be an alternative treatment to reduce spasticity in this patient population temporarily.

### What is already known on this topic?

Passive stretching can induce relaxation and decrease muscle tension in young people with spasticity. TTM can induce relaxation, decrease muscle tension, and decrease muscle pain in patients with myofascial pain syndrome.

### What this study adds?

TTM may decrease spasticity of the lower limb muscles in young people with cerebral palsy.

### Potential conflicts of interest

None.

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## ผลของการนวดแผนไทยต่ออาการแข็งเกร็งในเด็กสมองพิการ

พิศมัย มะลิลา, กัณฑ์กรกร สีดา, เสวต มาชม, ณัฐกานต์ สलगสิงห์, วิชัย อังพิณิจพงศ

วัตถุประสงค์: เพื่อศึกษาผลของการนวดแผนไทยต่ออาการแข็งเกร็งของกล้ามเนื้อในเด็กสมองพิการ

วัสดุและวิธีการ: เด็กสมองพิการชนิด spastic diplegia ช่วงอายุ 6-18 ปี ถูกคัดเลือกจากโรงเรียนศรีสังวาลย์ขอนแก่น วัดอาการแข็งเกร็งของกล้ามเนื้อ quadriceps femoris ข้างขวา โดยใช้ Modified Ashworth Scale (MAS) ทั้งก่อนและหลังการนวดแผนไทยทันที โดยอาสาสมัครได้รับการนวดแผนไทยบริเวณหลังส่วนล่างและขาทั้งสองข้าง 30 นาที โดยใช้สถิติ Wilcoxon Signed Ranks Test เปรียบเทียบผลก่อนและหลังการนวด

ผลการศึกษา: พบว่าในเด็กสมองพิการชนิด spastic diplegia จำนวน 17 คน อายุ  $13.71 \pm 3.62$  ปี มีค่า MAS ทั้งก่อนและหลังการนวดแผนไทย มีความแตกต่างอย่างมีนัยสำคัญ ( $1+, 1; p < 0.01$ ) และไม่มีรายงานถึงผลข้างเคียง

สรุป: การนวดแผนไทยสามารถลดความตึงตัวของกล้ามเนื้อที่แข็งเกร็งและเป็นทางเลือกหนึ่งที่สามารถนำมาใช้ลดอาการแข็งเกร็งของกล้ามเนื้อในเด็กสมองพิการ

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