

EFFECTIVENESS OF THE COURT-TYPE TRADITIONAL THAI MASSAGE
VERSUS TOPICAL DICLOFENAC ON TREATING PATIENTS WITH
MYOFASCIAL PAIN SYNDROME IN THE UPPER AND MIDDLE TRAPEZIUS

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จุไรรัตน์ บุญรวบ : ประสิทธิภาพการนวดไทยสายราชสำนักกับยาทาไดโคลฟีแนกในผู้ป่วยปวดกล้ามเนื้อทราพีเซียสส่วนบนและส่วนกลาง (EFFECTIVENESS OF THE COURT-TYPE TRADITIONAL THAI MASSAGE VERSUS TOPICAL DICLOFENAC ON TREATING PATIENTS WITH MYOFASCIAL PAIN SYNDROME IN THE UPPER AND MIDDLE TRAPEZIUS) อ.ที่ปรึกษาวิทยานิพนธ์หลัก: ผศ. ดร. ชนิตา พลานูเวช, อ.ที่ปรึกษาวิทยานิพนธ์ร่วม: รศ. ดร. นิจศิริ เรืองรังษี, รศ. นพ. สัณญาณ เนียมบุก, 120 หน้า.

กลุ่มอาการปวดบ่าพบได้บ่อยในคนทำงานออฟฟิศ วิธีมาตรฐานในการรักษาคือการใช้ยาซึ่งอาจเกิดอาการไม่พึงประสงค์ได้ ดังนั้นการนวดไทยสายราชสำนักอาจเป็นวิธีการรักษาทางเลือกหนึ่งสำหรับกลุ่มอาการปวดบ่าซึ่งลดโอกาสเกิดอาการข้างเคียงจากการใช้ยา ในการศึกษานี้มีวัตถุประสงค์เพื่อเปรียบเทียบประสิทธิผลการนวดไทยสายราชสำนักกับยาทาไดโคลฟีแนก ในผู้ป่วยปวดกล้ามเนื้อบ่าส่วนบนและส่วนกลาง โดยการเก็บข้อมูลและปฏิบัติการรักษาที่คณะแพทยศาสตร์มหาวิทยาลัยธรรมศาสตร์ ระหว่าง วันที่ 23 เมษายน 2557 ถึง 23 เมษายน 2558 แบ่งกลุ่มอาสาสมัครด้วยวิธีสุ่มแบบจับฉลาก กลุ่มรักษาได้รับการนวดรักษา 6 สัปดาห์ๆ ละ 2 ครั้งๆ ละ 30 นาทีและกลุ่มควบคุมได้รับยาทาๆ ครั้งละ 4 กรัม ทาวันละ 3 ครั้ง เป็นเวลา 6 สัปดาห์ ประเมินความปวดด้วยมาตรวัดความปวดด้วยสายตา ประเมินคุณภาพชีวิตด้วยแบบสอบถามเอสเอฟ-36 วัดองค์การเคลื่อนไหวคอ ก้มหน้า เงยหน้า เอียงซ้าย เอียงขวา และทดสอบความทนต่อแรงกดเจ็บของกล้ามเนื้อ กลุ่มได้รับการนวดมีผู้ป่วยจำนวน 45 คน และกลุ่มทายาไดโคลฟีแนกมีจำนวนผู้ป่วย 44 คน (หนึ่งคนออกจากการศึกษาเนื่องจากอุบัติเหตุ) การศึกษานี้พบว่า อายุ เพศ น้ำหนัก ส่วนสูง ระยะเวลาที่ปวด ข้างที่ปวด ก่อนการรักษาทั้งสองกลุ่ม ไม่แตกต่างกันอย่างมีนัยสำคัญ ($p > 0.05$) หลังการรักษาพบว่าทั้งกลุ่มรักษาและกลุ่มควบคุมมีระดับความปวดลดลงอย่างมีนัยสำคัญ ($p < 0.05$) คุณภาพชีวิตทั้งทางกายและจิตใจมีการพัฒนาอย่างมีนัยสำคัญ ($p < 0.001$) องค์การเคลื่อนไหวคอและความทนต่อแรงกดเจ็บของกล้ามเนื้อเพิ่มขึ้นอย่างมีนัยสำคัญ ($p < 0.05$ และ $p < 0.05$ ตามลำดับ) ผลการทดลองนี้แสดงให้เห็นว่าการนวดไทยสายราชสำนักมีประสิทธิภาพต่อผู้ป่วยที่มีอาการปวดกล้ามเนื้อบ่าส่วนบนและส่วนกลาง

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JURAIKAT BOONRUAB: EFFECTIVENESS OF THE COURT-TYPE TRADITIONAL THAI MASSAGE *VERSUS* TOPICAL DICLOFENAC ON TREATING PATIENTS WITH MYOFASCIAL PAIN SYNDROME IN THE UPPER AND MIDDLE TRAPEZIUS. ADVISOR: ASST. PROF. CHANIDA PALANUVEJ, Ph.D., CO-ADVISOR: ASSOC. PROF. NIJSIRI RUANGRUNGSI, Ph.D., ASSOC. PROF. SUNYARN NIEMPOOG, M.D., 120 pp.

Myofascial pain syndrome (MPS) commonly occurs among office workers. Pharmacological therapy is one of standard treatment; however adverse drug reaction is concerned. Court-type traditional Thai massage (CTTM) may be effective and safe for alternative treatment. This study aimed to investigate the effectiveness of CTTM compared to topical diclofenac among patients with myofascial pain in the upper and middle trapezius. The study was performed at the Faculty of Medicine Thammasart University during April 23, 2014 to April 23, 2015. MPS patients were randomly allocated by envelope. The treatment group received a session of 30-minute court-type traditional Thai massage twice a week for six weeks. The control group received 4 g of topical diclofenac gel three times a day for six weeks. The outcomes were investigated for pain intensity by visual analog scale (VAS); quality of life by the 36-item short form health survey (SF-36) ; cervical range of motion by cervical flexion, cervical extension, cervical left lateral flexion, cervical right lateral flexion (CROM); and tissue hardness by pressure pain threshold . There were 45 patients in CTTM group and 44 patients in diclofenac group (1 dropped out by accidental injury). Their age, gender, height, weight, pain period, and side of pain were no statistically significant different between two groups ($p > 0.05$) at baseline. After intervention, pain intensity significantly decreased ($p < 0.05$) in both treatment and control groups. There were statistically significant improvement in the quality of life scores which comprised of the physical component summary and the mental component summary scores ($p < 0.001$). All categories of the cervical range of motion as well as pressure pain threshold increased significantly ($p < 0.05$ and $p < 0.005$ respectively) in both groups. The results strongly suggested the capability of the court-type traditional Thai massage to be an effective treatment for patients with myofascial pain syndrome in the upper and middle trapezius.

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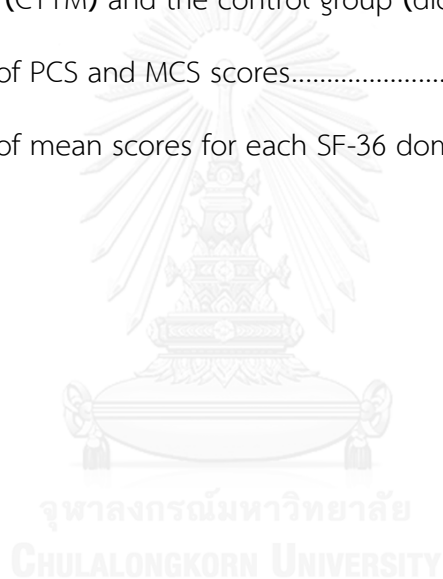
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LIST OF ABBREVIATIONS

%	Percent
°C	Degree celsius
ANOVA	Analysis of variance
BP	Bodily pain
CI	confidence interval
cm	Centimeter
CROM	Cervical range of motion
CTTM	Court - type traditional Thai massage
GH	General health
HRQoL	Health-related quality of life
kg	Kilometre
kg/cm ²	Kilogrammes per Square Centimeter pressure unit
L	Left
MCS	Mental component score
MF	Median frequency
MH	Mental health
mmHg	Millimeter of mercury
MPS	Myofascial pain syndrome
N	Number
NDI	Neck disability index
NSAIDs	Nonsteroidal anti-inflammatory drugs
PCS	Physical component score
PF	Physical functioning

PFs	Fibromyalgia. Perpetuating factors
PPT	Pressure pain threshold
QoL	Quality of life
R	Right
RP	Role functioning
SD	Standard deviation
SEM	Standard error of mean
SF	Social functioning
SF-36	Short Form-36
SG	Substantia gelatinosa
TrPs	Trigger points
TTM	traditional Thai massage
VAS	Visual analogue scale
VT	Vitality
WHO	World Health Organization

CHAPTER I

INTRODUCTION

Background and rationale of the study

Myofascial pain syndrome (MPS) refers to a syndrome caused by multiple trigger points (TrPs), hyperirritable spots connected to palpable nodules in muscle fibers' taut bands. MPS may be manifested in the form of referred pain [1-7]. A review of the literature in Thailand and abroad reveals that this illness is a major problem worsening patients' quality of life and their ability to perform daily life activities. For instance, the prevalence of MPS is as high as 36% with the patients mainly suffering skeletal and muscle abnormalities [8]. In addition, MPS is found in more women than men, and 45-54% experience pain in the upper trapezius, sternocleidomastoid muscles, levator scapulae, and suboccipital muscles [1, 4, 9].

MPS may be cured by treating TrPs or dealing with the factors causing the syndrome [8]. The former approach involves relaxing TrPs, such as medication, application of muscle relaxants and injection on the points where pain is experienced, stretching exercise, and massage [10-13]. Among these, the pharmacological approach is widely applied, using such medications as analgesics and nonsteroidal anti-inflammatory drugs (NSAIDs). One of the limitations of such drugs, however, is their side effects, including irritation of the stomach or the

intestine. Currently, traditional Thai massage is becoming more widely accepted in health care. In particular, it has been effectively used for alleviating muscle pain and enhancing physical motion since it can heal muscle fatigue as well as relieves stress, ache, and pain, including neck pain. Research showed that ischemic compression and deep friction massages could increase the pressure pain threshold (PPT) and reduce the visual analogue scores among patients suffering from neck and upper trapezius pain [9]. Another study indicated that traditional Thai massage in conjunction with ultrasound therapy was able to increase the range of motion of the neck and lower pain [10].

Despite its benefits, traditional Thai massage, specifically the court-type, has been little investigated in terms of its therapeutic effectiveness in relieving musculoskeletal pain. The present study, therefore, aims to assess the effectiveness of the court-type traditional Thai massage in reducing MPS in the upper trapezius through a randomized controlled trial. It is hoped that the research findings will contribute to the existing body of knowledge pertaining to alternative treatment of patients suffering from MPS.

Research gap

There was no study reported the effectiveness of the court-type traditional Thai massage in relieving MPS of the upper trapezius as follow-up for long term treatment.

Research question

Can the court-type traditional Thai massage alleviate MPS of the upper and middle trapezius in comparison with topical diclofenac?

Research hypothesis

The court – type traditional Thai massage is better treatment than topical diclofenac among patients with myofascial pain syndrome of upper and middle trapezius.

Research objectives**General objective**

To assess the effectiveness of the court-type traditional Thai massage compared to topical diclofenac in reducing MPS of the upper and middle trapezius.

Specific objectives

1. To compare the visual analogue scale (VAS) scores of the patients treated with the court-type traditional Thai massage and topical diclofenac.
2. To compare the cervical range of motion (CROM) scores of the patients treated with the court-type traditional Thai massage and topical diclofenac.
3. To compare the pressure pain threshold (PPT) scores of the patients treated with the court-type traditional Thai massage and topical diclofenac.

4. To compare the quality of life (QoL, SF-36) scores of the patients treated with the court-type traditional Thai massage and topical diclofenac.
5. To compare the effectiveness of the court-type traditional Thai massage and topical diclofenac in treating MPS of the upper trapezius.

Conceptual framework

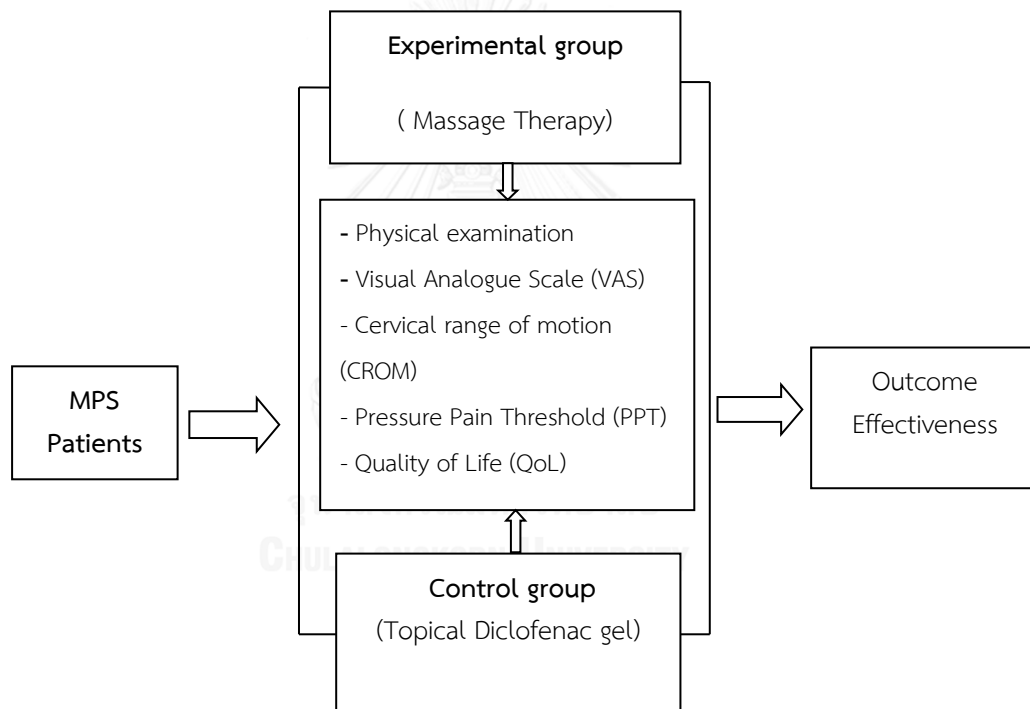


Figure 1 Conceptual framework

Operational definition

1. Court - type traditional Thai massage: Court - type traditional Thai massage (CTTM) is the art and wisdom consists of politeness and safety, no elbow or knee are used. The main actions are pressing along the lines and different points of the body using big thumb and hand to restore various systems of the body to treat, enhance, prevent and health rehabilitation [14].
2. Myofascial pain syndrome in upper and middle trapezius: Myofascial pain syndrome (MPS) is defined as referred pain and/or autonomic symptoms in certain regions of the body caused by myofascial trigger points (TrPs) of muscles or adhesion bands [1, 2, 15].
3. Topical diclofenac: Diclofenac is a non-steroidal anti-inflammatory drug (NSAID) and works by preventing the production of irritant chemicals which cause pain and inflammation. It is used topically to ease muscular pains, sprains and strains [16].
4. The treatment group: Myofascial pain syndrome patients who received CTTM intervention.
5. The control group: Myofascial pain syndrome patients who received topical diclofenac.

CHAPTER II

LITERATURE REVIEW

Myofascial pain syndrome

Myofascial pain syndrome (MPS) is defined as referred pain and/or autonomic symptoms in certain regions of the body caused by myofascial trigger points (TrPs) of muscles or adhesion bands (Figure 2) [2, 14, 17-22]. If the syndrome persists or recurs for longer than three months, it is called chronic MPS [15].

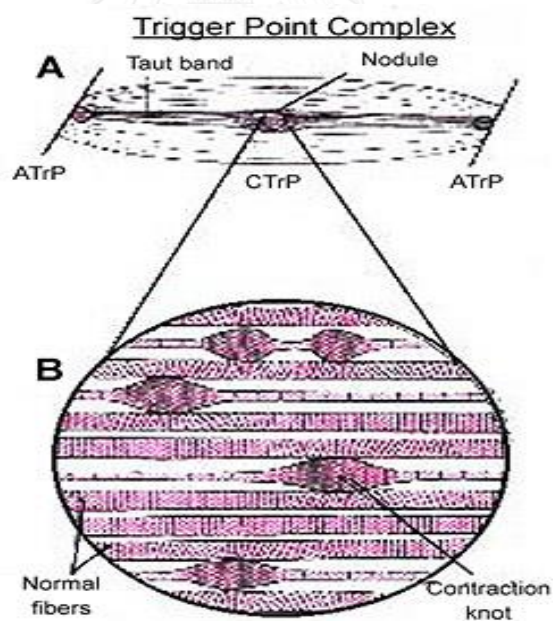


Figure 2 Myofascial trigger points (TrPs) [23].

The incident rates of MPS is found to be about 21% in general orthopaedic patients and 30% in general practice clinics [24].

Pathogenesis

1. Despite its unknown actual mechanism, MPS is believed to be caused by the dysfunction of the peripheral nociception and central sensitization [18, 25-27].

The sequence in which MPS occurs is as follows:

2. Excessive tender Line muscle to bone on a particular muscle group resulting from physical and/or psychological overload to the level where motor endplate dysfunction takes place. This helps to explain why the muscle bundle with TrPs leading to MPS frequently experience fatigue.
3. Muscle contraction knots, self-sustained contractions on TrPs leading to taut bands or nodules that inhibit motion. Accumulation of waste products can also result in several types of pain although the inflammatory-process cell has not been identified.
4. Autonomic nervous disturbance caused by the accumulation of waste products and leading to regional autonomic symptoms.
5. Central sensitization causing TrPs to be more hyperirritable.

Clinical symptoms

1. Regional referred pain that is only mild and irritating to severe. The TrPs of each muscle bundle are associated with unique referred pain [28] which helps in the identification of the TrPs in which pain originates.
2. Accompanying autonomic systems include vasoconstriction, syncope, and beriberi, as well as physical signs such as anemia, pilomotor activity, and diaphoresis in the area of referred pain. For pain in the TrPs of the supraclavicular division, dizziness, tinnitus, and blurring of vision [29].

Pain

The International Association for the Study of Pain defines pain as an uncomfortable feeling and experience taking place in conjunction with injured tissues [30]. A similar definition is that pain is a physiological reaction to a stimulus that injures body tissues, including operation, swelling from infection, blood clot, muscle contraction, heat, cold, electric current, and external and internal chemical substances [27]. The level of pain felt by individuals varies depending on their attitudes, beliefs, values, personality, and past experiences. According to McCaffery pain is a personal experience lasting until it is no longer perceived by an individual [31].

In short, pain is an undesirable feeling occurring together with injured tissues and experienced differently by various individuals.

Types of pain

Pain can be classified according to its duration as follows:

1. Acute pain - Acute pain takes place shortly after a hazardous stimulus injures tissues and may last a few seconds to 3-6 months. Although this type of pain requires immediate treatment, it will alleviate when the injured tissues heal. Acute pain usually results from known causes with obvious painful feelings, symptoms of the autonomic nervous system, and infection, such as operation, intestinal obstruction or perforation, ureteral obstruction, and injury from heat or cold [27].
2. Chronic pain - This type of pain lasts longer than six months. It is gradual yet constant and normally cannot be cured. There are no symptoms of the autonomic nervous system or facial expressions associated with pain; hence, it is hard to tell whether a patient is suffering. Treatment requires several approaches, taking into account the pathology and environmental factors. Since the pain persists for a long time, it negatively affects the quality of life, personality, daily life, job performance, and duties and lifestyle [31].

Mechanisms of pain

The mechanisms of pain widely accepted and used are the gate control theory and the endogenous pain control theory.

1. Gate control theory

Developed by Melzack and Wall the gate control theory explains the physical and mental mechanisms of pain as follows [32]. :

- a. The control mechanism in the medulla spinalis controls the gate through the nerves in the substantia gelatinosa (SG) area, whereby the nerve impulses stimulated by several organs of the body go through the A-beta and the A-delta and the C-fiber before joining with the transmission cells. This will activate the perception of the brain, and hence pain occurs. Meanwhile, the SG cells along the medulla spinalis function as the gate to open and close, or promote or inhibit the transmission to the transmission cells. In turn, the promotion or inhibition depends on the nerve impulses in the A-beta, A-delta, and C-fiber. Specifically, if the A-beta has stronger nerve impulses, the SG cells will be stimulated. As a result, the nerve impulses activating the transmission cells will be inhibited, there by stopping pain from being transmitted to the brain. In other words, the gate is closed. On the other hand, if the A-delta and C-fiber has stronger nerve impulses, the SG cells will

be inhibited, leading to transmission to the transmission cells and hence pain.

That is, the gate is opened.

- b. The central control system receives nerve impulses from the dorsol horn, which transmits information pertaining to dangerous stimuli to the thalamus and limbic system. In this process, the nerve impulses from the A-beta will be transmitted through two channels. That is, thallescithia will be sent to the central control system before influencing the close or control mechanism of the medulla spinalis. The functions of this central control system can be further divided into three interrelated areas.
- c. The sensory-discriminative system - the nerve impulses will be transmitted to the thalamus, functioning to sense and discriminate the severity, characteristics, and position of pain.
- d. The motivational-affective system - the nerve impulses will be sent to the reticular formation near the brain stem and further transmitted to the periaqueductal grey hypothalamus, which links the thalamus with the somatosensory cortex of the brain. In addition, the limbic system arouses uncomfortable feelings and dissatisfaction with pain.
- e. The cognitive-evaluative system - this system is operated by a higher nervous system called neocortisol, which assesses incoming signals, evaluates pain, as well as analyzes the significance of a pain stimulus, past experiences

relating to pain, and perception and memory. These three sub-systems coordinate and are interrelated in the process of pain perception and the transmission of nerve impulses to control pain at the medulla spinalis through three channels: the corticospinal tract, which governs the gate control mechanism of the medulla spinalis in modifying pain signals; the reticulospinal tract through the function of the reticular formation, which transmits nerve impulses to control the gate at the medulla spinalis; and the action system, which induces reaction to pain after it is perceived [33].

2. Endogenous pain control theory

The human body produces natural pain inhibiting substances acting like morphine. The substances can be classified into three types:

- a. Enkephalin - this is commonly found in the central nervous system but is most active in the dorsol horn, thus inhibiting pain by closing the gate of the medulla spinalis and stopping the transmission of nerve impulses to the brain.
- b. Endorphins - mostly found in the pituitary gland, endorphins reduce pain in 2 ways. Like enkaphalins, they inhibit a neurotransmitter substance P at the presynaptic terminal, specifically the peripheral nervous system. In addition, endorphins act at the postsynaptic terminal by stopping the transmission of pain impulses with the release of enkaphalins via the descending system.

- c. Dynorphins - this substance is found in the substantia nigra, the periaqueductal gray hypothalamus, and the medulla spinalis. Dynorphins are effective in relieving pain and are believed to play a role in emotional control. [34].

Pain assessment

The visual analogue scale (VAS) is an instrument for measuring the characteristic of a value. It is a horizontal line 10 cm in length with word descriptors at both ends. To indicate the perception of their current pain, the patients are required to mark on the line. Mild MPS is a point on the VAS from 1 to 3, moderate MPS from 4-6, and severe MPS from 7-10 [35].



Figure 3 Visual analogue scales (VAS)

Pain management

Pain management is carried out to prevent an increase in severity and alleviate pain. There are two approaches: medicinal and non-medicinal.

1. Medicinal approaches

The medicines used for controlling pain fall into several types, including non-opioid analgesics, opioid analgesics, and adjuvant drugs, such as relaxants, anxiety pills, and sleeping pills. The WHO divides analgesics into three types.

a. Non-opioid analgesics

1. Non-steroidal anti-inflammatory drugs - These do not directly inhibit pain but stop the transduction process by reducing the release of chemical substances such as substance P histamine.
2. Acetaminophen - The drugs falling into this type have the effect of inhibiting the production of prostaglandins in the central nervous system.

b. Opioid analgesics

- i. Analgesics used for treating moderate or severe pain, such as codeine.
- ii. Analgesics used for treating severe pain, such as morphine.
- iii. Adjuvant drugs, such as sleeping pills, used to enhance sleep and anticonvulsants, used to relieve neurological pain.

2. Non-medicinal approaches

Pain relief activities are currently implemented to substitute medicines in case of mild pain or to complement medicines in case of moderate or severe pain. Several non-medicinal approaches have been developed.

1. Education or provision of knowledge

Educating or providing knowledge to patients before the onset of pain will increase the perception of the central control system, enabling them to have the right expectation regarding the feelings and incidents they will experience. This will also reduce stress, fear, and anxiety, thereby boosting tolerance to pain [36].

2. Relaxation techniques

Relaxation refers to a condition in which the body and mind are free from stress. Since anxiety and muscle stiffness are interrelated, the former can increase the level of muscle pain. Thus, relaxation techniques reduce mental stimuli and get the muscles relaxed, thereby cutting the cycle of pain [31].

3. Modification of the posture of patients

The right posture during daily activities will prevent excessive muscle stretching as well as eliminate the pressure on and the stiffness of the area where pain is experienced, thereby reducing pain stimuli [2].

4. Massage

Massage stimulates large nerve fibers and thus inhibits pain impulses to the brain. As a result, pain decreases. Specifically, massage reduces pain by cutting down perception and emotional stimuli. In this process, signals are transmitted to activate the neurotransmitters from the cerebral cortex to send nerve impulses to the dorsol horn. When the nerve impulses are not transmitted to the brain, the gate of pain is closed.

Massage is a form of touching, making the patients feel warm, comfortable, and relaxed in terms of both the body and the mind. During a massage, a chemical substance acting like morphine is released, inhibiting P substance and thus reducing pain. Additionally, while being massaged, the patients have the chance to exchange ideas, opinions, and feelings with the therapists. This will activate the pain control center in the brain to release pain inhibiting substances [37].

5. Touch

Like massage, a touch stimulates large nerve fibers and hence the SG cells in the medulla spinalis. Consequently, pain impulses are inhibited. Also, a touch relaxes the mind, thus transmitting signals from the central control system to close the gate of the medulla spinalis [38]. According to the endogenous pain control theory, when large nerve fibers are stimulated using a touch, enkaphalins and endorphins will be released to inhibit the action of P substance. As a result, cells will stop sending pain impulses to the brain.

6. Distraction

Distraction is defined as a technique in which the patients are distracted from the pain that is going to take place using stronger stimuli, thereby reducing the perception of pain and the severity of pain stimuli [31].

Diagnosis

It can be done by exerting mild finger pressure on the TrPs likely to cause pain, including the followings:

1. Hyperirritable spots that is more sensitive to pain than nearby areas.
2. Spots that can be stimulated to exhibit reproducible symptoms by pressure or needling procedures.
3. Superficial TrPs where taut bands similar to nodules can be felt with stroking.

Note that TrPs are clustered and each is small with a diameter of only 2-3 mm. Diagnosis is based mainly on clinical consideration of medical history relating to pain and/or regional autonomic symptoms, physical examination, and muscle assessment by stroking or finger pressure. To confirm MPS, the TrPs causing pain must be identified [39-41]. Laboratory tests are not necessary for the identification of MPS since no clear abnormality will be found; nevertheless, radiodiagnosis may be done in case co-morbidity is possible [42].

MPS can take place in an acute or chronic form. For acute MPS, past history concerning sudden overload such as sprain, strain, or injury is also taken into consideration. This type of illness usually recovers over time until it is completely healed. Additionally, topical treatment of the TrPs causing MPS is generally effective. As regards chronic MPS, perpetuating factors normally play a role in prolonged

symptoms. It is also often co-morbid with osteoarthritis and fibromyalgia. Perpetuating factors (PFs) can be divided into three broad types [42].

1. Physical PFs, including poor physical conditions and poor posture. Microtrauma caused by repetitive overload on a certain muscle bundle from daily life activities or work is another factor. Not recognizing this, many patients report having MPS without identifiable causes. As a result, the recurrence of TrPs is not unexpected.
2. Psychological PFs, including anxiety/stress and despair/depression.
3. Systemic PFs, including conditions relating to low levels of vitamins B1, B6, B12, and C, as well as folic acid, leading to exhaust and occasional beriberi; and borderline hypothyroid conditions, characterized by fatigue, inactivity, shivering, and constipation.

In addition to differential diagnosis [1, 43]. MPS may resemble the symptoms of, or be co-morbid with other illnesses. Thus, differential diagnosis must take into account the following four issues:

1. MPS can occur to all physical areas, so differential diagnosis involves identifying the cause of pain as to whether it originates from the trapezius, the neck, the head, or the chest. For example, MPS must be differentiated from tension-type headache/migraine and angina pectoris since it can lead to headache and left chest pain.

2. The area where pain is experienced may be narrow around certain joints or broad depending on the TrPs of each muscle bundle. For the former, MPS must be distinguished from osteoarthritis, bursitis, or tendinitis. As regards the latter, differentiation from neuralgia or peripheral neuropathy is essential.
3. In case TrPs spread in several areas, MPS must be differentiated from illnesses causing widespread pain such as fibromyalgia.
4. Chronic MPS is often co-morbid with osteoarthritis.

Treatment

MPS is a condition for which a wide variety of treatment options are possible because it is one of the illnesses which are least understood and for which differential diagnosis is most difficult. Initially, it is necessary to identify whether the complaints correspond to primary or secondary MPS and whether the MPS under diagnosis is co-morbid with other diseases.

Treatment of primary MPS

Not associated with any PFs, primary MPS is chronic due to ignorance in the process of diagnosis. All treatment options for TrPs or TrP eradication are effective and do not differ in terms of evidence-based results. A suitable treatment may depend on its contraindications and the patient's choice. Long-term preventive treatment should take safety and self-care issues into consideration.

Standers treatments for TrP eradication include the following:

1. Stretching of the muscles experiencing TrPs

Stretching is a standard treatment to be administered on all patients suffering from MPS [44] The muscle to be treated should be stretched slowly until it becomes taut or feels slightly painful and then prolonged for a short period of 20-30 sec. This should be repeated five to 10 times twice a day for two weeks (1 course). The advantages of muscle stretching are safety, convenience, and possibility of self-care. Atipon 2011 (studied the effects of neck exercise between stretching exercise and relaxation breathing exercise on pain level (VAS), surface EMG median frequency (MF) and the neck disability index score (NDI) in chronic neck pain female office workers who are prolonged computer users. After four weeks of study. The result revealed that stretching exercise potentially improved muscle fatigability of the neck muscles in the non-dominant side [44-46].

2. Massage [39, 47-50]

Traditional Thai massage can cover a large area of pain with the side benefit of deep relaxation. It can be classified into ayurvedic massage, focusing only on acupressure, and the Wat Pho-type massage, involving stretching and flexing. Although the latter is effective in the treatment of TrPs, it should be avoided in patients with mechanical instability.

3. Physiotherapy [51]

This is comprised of a variety of procedures, such as hot press, massage, stretching, or a combination.

4. Acupuncture [52-54]

The needle tip will help to relax TrPs through mechanical disruption. It is found that 71% of the acupuncture points correspond to TrP spots.

5. Dry needling on TrPs [23, 55-58]

Dry needling is the use of a solid needle for therapy of muscle pain (myofascial pain). Dry needling contrasts with the use of a hollow needle to inject substances. Such use of a solid needle has been found to be as effective as injection of substances in such cases as relief of pain in muscles and connective tissue. Acupuncture and dry needling techniques may be similar, but their rationale and use in treatment are quite different.

6. Trigger point injection [1, 23, 44, 59, 60]

It is believed that TrPs are treated because of the insertion of the needle with the use of a medication to only enhance the effect. Local anesthetic is commonly used. It is suggested that an anesthetic contain a low myotoxic content and have a sufficient concentration to inhibit sensory fibers, not motor fibers, such as 0.5% bupivacaine or 1% lidocaine. In addition, the anesthetic must not contain adrenaline

content that can cause contraction of the blood vessels around the TrPs. A recommended dosage is between 0.5 and 2 mm per point depending on the size of the muscle. For safety, the maximum dosage per time must be carefully considered in case of treatment of multiple TrPs.

7. Botulinum toxin injection [16, 61]

This costly procedure is subject to indications in case of refractory TrPs or TrPs responsive to TrP eradication for only a short period. Thus, it should be under the consideration of experts only.

8. Pain alleviation [35]

For mild to moderate pain, general pain relievers such as acetaminophen may be prescribed, particularly during the first phase of some methods of TrP eradication that may cause post-treatment pain, such as trigger point injection and acupuncture. Aspirin should be avoided since it can increase the risk of bleeding. Moderate or severe pain, on the other hand, may require prescription of tramadol drugs, but prolonged use is not recommended. Another painkiller commonly used in the treatment of MPS is NSAIDs, but the outcomes are often not as satisfactory as expected because inflammatory-mediated cells associated with TrPs have not been identified. Nonetheless, NSAIDs may be beneficial for MPS with the co-morbidity of inflammatory joint diseases.

Topical application of muscle relaxants may not be suitable for the treatment of MPS owing to the lack of evidence for their effectiveness in relaxing or curing TrPs. Moreover, overload may occur as a result of the impact of relaxants on surrounding muscles. Muscle relaxants will be effective only in patients with muscle spasm or muscle tension in the areas around TrPs. Another topical procedure, injection of steroids, is often administered in order to relieve pain and fibrosis conditions of TrPs. Unfortunately, it is not encouraged because of the lack of supporting evidence for its effectiveness and the local and systemic side effects of steroids.

a. Medications for treating PFs

Vitamins and antidepressants can be used in the treatment of PFs. Anxiolytics such as clonazepam may be prescribed for a short period as necessary.

b. Medications for treating co-morbidity

Medications may be prescribed for the treatment of diseases with which MPS is co-morbid, such as osteoarthritis and neuropathic pain.

Treatment of secondary MPS

Secondary MPS is induced by PFs; hence, TrP eradication is conducted only in response to symptoms and effective only temporarily. Long-term treatment has to focus on identifying and dealing with the cause. As detailed above, PFs can be divided into three categories, and a patient may suffer from more than one type of PFs [35].

According to the treatments mentioned above, NSAIDs with tropical diclofenac and Thai traditional massage was applied and compared in this study. Both treatments are described as below:

Nonsteroidal anti-inflammatory drugs

Nonsteroidal anti-inflammatory drugs (NSAIDs) are effective in alleviating pain caused by inflammation developed from aspirin. It has long been known and commonly used. Because of their variety and different effects, it is difficult to determine which is best.

Mechanisms of actions

Inflammation of organs results from prostaglandin releasing inflammatory agents. NSAIDs inhibit the enzyme called cyclooxygenases, thereby reducing the function of prostaglandin, inflammation, and pain.

Types of NSAIDs

NSAIDs can be classified into two groups: non-selective NSAIDs and selective NSAIDs. Non-selective NSAIDs include aspirin, ibuprofen, naproxen, and diclofenac. Inhibiting both COX-1 and COX-2 enzymes, these NSAIDs irritate the stomach and cardiovascular organs and thus are not suitable for patients with heart disease undergoing balloon procedures, paralysis, and paresis, as well as those prone to risks of heart disease. Selective NSAIDs such as celecoxib, in contrast, inhibit only COX-2 enzymes, making them less irritating than those in the first group. However, they should not be prescribed for patients with gastritis and prior excessive bleeding.

Indications

NSAIDs include analgesics such as diclofenac, fenoprofen, floctafenine, and ibuprofen; anti-inflammatory medications such as flurbiprofen, indomethacin, naproxen, and sulindac; anti-dysmenorrheal medications such as diclofenac, flurbiprofen, ibuprofen, and indomethacin; anti-gout agents such as diclofenac, fenoprofen, floctafenine, and ibuprofen; anti-pyretic medications, namely ibuprofen, indomethacin, and naproxen; anti-rheumatic medications such as diclofenac, diflunisal, etodolac, and fenoprofen; vascular headache prophylactics such as fenoprofen, ibuprofen, indomethacin, and mefenamic acid; and vascular headache suppressants such as diclofenac, diflunisal, etodolac, and fenoprofen.

1. Risk factors for heart and vascular diseases

- a. NSAIDs increase the risks of myocardial ischemia and cerebrovascular disease, especially with prolonged use in patients prone to heart and vascular diseases.
- b. NSAIDs must not be prescribed for patients after cardiovascular operations.

2. Risk factors for the gastrointestinal track

NSAIDS can increase complications of gastrointestinal track diseases, such as gastrointestinal track bleeding, gastric ulcer, and peptic ulcer perforation.

3. Side effects

- a. Oppression in the chest, fatigue, gasps, and symptoms associated with cerebral ischemia
- b. Hematemesis and melena
- c. Phlegm with blood and melanemesis
- d. Swelling in the feet or weight gain
- e. Oligouresis
- f. Nausea, oppression in the costa border, concentrated urine, pale white stool, and pathologic jaundice
- g. Rashes, hemophilia, and myoasthenia

- h. Severe allergies in conjunction with fever, sore throat, swelling in the face and eyelids, and exfoliative dermatitis, such as Steven Johnson's syndrome and erythema multiform.
- i. Irritation to the stomach, low dosage and temporary use can result in abdominal distension and colic, while high dosage and prolonged use can cause gastritis and bleeding.
- j. Hepatitis in case of prolonged use
- k. Nephropathy even in case of temporary use
- l. Tinnitus, especially among patients taking a high dosage
- m. Stupefaction, nausea, and headache
- n. Rhinorrhea and sore throat

Topical diclofenac

Diclofenac is a non-steroidal anti-inflammatory drug (NSAID) and works by preventing the production of irritant chemicals which cause pain and inflammation. It is used topically to ease muscular pains, sprains and strains. There are various forms such as oral medication, spray, patch and gel.

Diclofenac is avoided to use with patients criteria as follows:

- Pregnant or breast-feeding woman
- Having asthma or breathing problems
- Having previous unusual reaction after taking aspirin or a non-steroidal anti-inflammatory drug (NSAID) such as indometacin, ibuprofen or naproxen, or any other medicine
- Having inflamed or broken skin
- Severe kidney disease patients [62-64]

Topical diclofenac side effects

It may cause an allergic reaction: hives; difficulty breathing; swelling of your face, lips, tongue, or throat. Less serious side effects may include mild nausea, stomach pain, upset stomach, diarrhea, gas, mild itching, dryness, redness, scaling, or other skin irritation where the medicine was applied.

Although the risk of serious side effects is low when diclofenac is applied to the skin, it could be aware of side effects that can occur if the medication is absorbed into bloodstream.

Therefore, stop using this medicine if patients have a serious side effect such as:

1. chest pain, slurred speech, problems with vision or balance, and feeling weak or short of breath;
2. bloody or tarry stools, coughing up blood or vomit that looks like coffee grounds;
3. pale or yellowed skin, dark colored urine, confusion;
4. swelling or rapid weight gain, urinating less than usual or not at all;
5. nausea, upper stomach pain, itching, loss of appetite, dark urine, clay-colored stools, jaundice (yellowing of the skin or eyes);
6. bruising, severe tingling, numbness, pain, muscle weakness;

7. fever, sore throat, and headache with a severe blistering, peeling, and red skin rash; or the first sign of any skin rash, no matter how mild [65].

Court - type traditional Thai massage

A healing procedure in traditional Thai medicine since ancient times, traditional Thai massage falls into two main types: folk massage inherited from ancestors and massage formally learnt in institutes. The latter can be further divided into the popular type traditional Thai massage or Cha Loei Sak and the court type traditional Thai massage or Raja Samnak. The Raja Samnak massage has been taught at Ayurvej School since its establishment in 1982 and promoted by Mr. Narongsak Boonratanahiran, an expert who has learned the skills passed on by generations of practitioners working in the palace [14, 47].



A



B

Figure 4 Massage posture; Cha Loei Sak (A) and Raja Samnak (B)

In the court – type traditional Thai massage, only the fingers and hands are used to heal and rehabilitate the patients because the use of the feet is considered impolite. The massage follows certain procedures. First, a practitioner begins a treatment session with gestures of polite manners such as “wai” to show their apologies for touching the patient’s body. Then a physical examination is performed drawing on the arts of traditional Thai medicine together with modern medicine [10]. According to the traditional Thai medicine theory, the patient’s pulses at the wrist and ankle will be measured to determine their upper and lower wind power. After that, a massage is carried out by pressing and kneading the patient’s massage lines and points using the fingers and palms. The posture and angle of the practitioner are also employed to control the extent and direction of pressure. To ensure the power of their fingers and body, practitioners have to practice by squeezing beeswax. They also need to sit in a locked cross-legged posture, called Kat Samat Phet, on a floor, lift the whole body up from the floor, and keep standing in that position for at least 60 seconds. This practice is referred to as Yok Kradan.

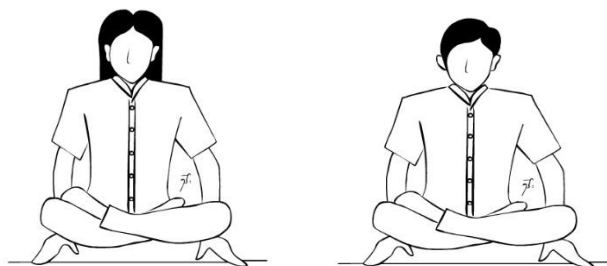


Figure 5 Yok Kradan

Benefits

A popular alternative for the promotion of health, [30] the court type traditional Thai massage helps to stimulate blood circulation as well as the lymphatic and nervous systems, relax the muscles, and cure diseases or abnormal conditions causing pain, strain, or fatigue in various body parts. In addition, it helps to relieve suffering from several diseases and abnormal conditions, such as paralysis caused by stroke and frozen or stiff shoulder. Also, it reduces aching pain as well as back and leg pain in women during their pregnancy or after delivery.

Contraindications and precautions

The patients must be screened. Those having a temperature of over 38.5 °, an acute infection, a blood pressure of above 160/100 mmHg, and the symptoms of palpitation, fainting, nausea, and vomiting will not be given the treatment. Additionally, massage near the areas of broken or cracked bones, bones during healing, tumors, open wounds, surgical wounds dating less than one month, deep vein thrombosis, and implantation or prosthesis is avoided [10]. For pregnant women, the elderly, and patients with diabetes, osteoporosis, and loose or dislocated joints, extra precautions are also taken [14].

Basic massage

This is the type of massage in which the practitioners massage along the specific lines or points on the body to stimulate muscles, blood and lymphatic circulation and nervous system. Its aim is to prepare the body for the massage of the signal points.

Massage of the signal points (Thai name for single point – Jude Sunyan)

This is the type of massage in which the practitioner massages the signal points. The effect of this type of massage is to stimulate the power of the nerves and to control the distribution of blood and heat to parts of the body. There are 50 major signal points (Thai name – Jude Sunyan Mae) all over the body: most are located on the massage lines for basic massage. Minor signal points are not mentioned here because they are used in only some condition.

Steps and techniques for basic massage

The practitioner has to learn and strictly follow the steps and techniques used in court-type traditional Thai massage, to achieve good outcome for the patient [14].

Position of patient

In court-type traditional Thai massage, the client does not have to take off his/her clothes and should stay in one of the following postures according to the lines or points that the practitioner will work on.

1. Supine position

The client lies down on the back, with a pillow under the head, arms along the side of the body or over the abdomen above the navel.



Figure 6 Patient in supine position

2. Lying on one's side with one knee bent

The client lies down on one side with a pillow under the head. If the client lies on the left side, he/she stretches out the left arm and bends the right knee so that the right heel touches the left knee. The client does the opposite if he/she lies on the right side.



Figure 7 Patient lying on one's side with one knee bent

3. Sitting position

The client may sit cross-legged (Thai name – Kud Samart) on the floor or sit on platform with the legs dangling, depending on the client's condition and the setting of the place.



Figure 8 Patient in sitting position

Postures of the practitioner

The practitioner will be in one of the following positions depending on the massage lines or points to work on:

1. Sitting posture (Thai name – Nang Pup Pieb)

The practitioner sits on the floor with the legs tucked back, for politeness pointing the toes to the client's legs.

2. Kneeling posture (Thai name – Nang Kook Kao)

The practitioner kneels down on the floor; his/her bottom does not touch the heels.

3. Hanuman presents the ring posture (Hanuman is a white monkey, one of the creatures in the Ramayana)

The practitioner kneels down behind the client but keeps one knee on the floor and lifts the other up as in practitioner in Hanuman presents the ring posture.

4. Four-Faced Brahma posture (Thai name – Prom See Nha, the name comes from the similarity of the posture to one of the boxing poses)

The practitioner kneels down behind or beside the client: keeps one knee on the floor and lifts the other up, the arm that is not used for pressing holds the client's arm or supports the client's head depending on the point to massage.

5. Standing posture

a. High - standing posture

The practitioner stands behind the client with both feet about a kueb (Thai unit of length about 20 cm.) from where the patient is sitting and places the feet apart, no more than the width of his/her own shoulders.

b. Medium-standing posture

The practitioner stands as in the high-standing posture with one foot placed behind the other, slightly bending the knee of the leg in front.

c. Low standing posture

The practitioner stands as in the medium-standing posture, but bending the knee more and lifting the heel of the back leg from the floor

[14, 47].

Massage lines/points for basic massage

The following are lines and points for the basic massage:

1. Lines and points for basic massage of the leg
2. Lines and points for basic massage of the outer part of leg
3. Lines and points for basic massage of the Inner part of leg
4. Lines and points for basic massage of the back
5. Lines and points for basic massage of the Inner side of the arm
6. Lines and points for basic massage of the outer aspect of the arm
7. Lines and points for basic massage of the shoulder joint
8. Lines and points for basic massage of the shoulder
9. Lines and points for basic massage of the neck
10. Lines and points for basic massage of the abdomen

Placing the fingers

The practitioner uses one of his/her thumbs or places both thumbs side by side depending on the point to massage. In some postures or locations, the practitioner uses the index, middle, ring or little finger or in some cases, the practitioner uses his/her palm for example, to open the wind-gate. Inexperienced learners must be careful when using palms since it creates more pressure than using only one thumb, so it may injure the client [14].

Extent and direction of the force

The name for the way in which the practitioner determine the extent and direction of the force used in the massage with his/her posture, the place where he/she sits or stands, and the force used to press, is angle (Thai name-Matra Ong Sa). The extent and direction of force must be adjusted according to the diseases and, above all, the sensitivity or feeling of the client which the practitioner has to periodically check or observe. In massage is called light, medium or hard.

Period

It is the duration for pressing on each point. The practitioner roughly establishes the period as:

1. Short period each point is pressed for 10-15 seconds, usually used in basic massage.

2. Long period each point is pressed for 30-45 seconds, usually used in massage of the signal points.

The practitioner must do the massage gently and smoothly, by using the correct force so the client does not feel pain or soreness after the session. Generally, this is called adjusting the “taste” of the hand (Thai name – Taeng Rod Mue – comparable to cooking by adjusting the taste of the food, which does not come only from the ingredients but from the hand of the cook). It means the way in which the force is applied on each point, which can be separated into three intervals:

3. Retarded interval the period when the practitioner places the thumb at the point he wants to press and slowly increases the force, but still not to the extent he wants.

4. Accentuated interval the period when the extent of the force is increased to the desired extent, including the direction of the force.

5. Steady interval the period when the practitioner keeps pressing at the point with the desired extent and direction of the force until the time allotted for that point [14].

Effect of massage

1. Circulatory and blood flow

Massage dilates superficial blood vessel and increases the rate of blood flow. This effect measured for gentle massage, supported conclusions from a previous experiment, with local anesthesia that arteriolar dilation is primarily controlled by local axon reflexes. Forceful massage in a healthy adult increases both local blood flow and cardiac stroke volume. The local vascular response is mainly due to histamine release, and increased stroke volume reflects improved venous return. These effects are longer lasting than those of gentle pressure and represent a potent means to accelerate healing. Flow rates usually return to normal after deep massage. Vasodilator drugs administered at the same time as deep massage cause longer lasting hyperemia [66]. Such effects upon Blood flow also suggest that massage should improve the performance of fatigued muscle. Massage muscle fibers display less spasm, an increased force of contraction and enhanced endurance compared with muscle simply rested. These massage effects are abolished by arterial occlusion [66].

2. Venous blood flow

Deep massage promotes venous return and increases cardiac stroke volume. The few attempts to measure this effect concern external compression. An optimum

regime expelling 80 ml blood per minute from the veins of the lower leg required a maximal pressure of 40 mmHg, rising at a rate of 8 mmHg with an interval of 1 min between each cycle. Firm manual massage may reasonably be expected to cause similar venous flow [66].

3. Blood enzyme concentrations

Deep massage causes sufficient muscle damage to elevate the serum concentrations of myoglobin and the enzyme glutamic oxaloacetic transaminase, creatine kinase and lactate dehydrogenase. Manual therapy may therefore confound diagnoses or biochemical measures of performance based upon the concentration of these substances [66].

4. Muscle

Muscle spasm is extremely uncomfortable, being both the product and the cause of pain. Massage reduces discomfort, relieves the associated muscle spasm and permits improved function. Post exercise effleurage reduces subsequent muscle soreness by rapidly reducing the concentration of lactate in the muscle cells. This is a more effective than either rest or rest or a conventional active warm-down programme Percussive massage, one advocated as part of post exercise therapy, fails to influence the rate at which muscle recovers from fatigue and is unlikely to assist athlete [66].

5. Pain

Massage has traditionally been used to relieve pain although research has only recently provided an acceptable physiological explanation to this observation.

Rubbing may interfere with pain signals' pathways to your brain, a process called the "gate control theory," according to experts. Pain impulses run toward the spinal cord and then up the cord and into the brain. It's only when they reach the brain that these impulses, are perceived as pain. When doing rubs, it sends other impulses along the same nerves. When all these impulses try to reach the brain through nerves, the nerves get clogged like a highway during morning rush hour. Most of them won't reach the brain. And if the pain signals do not reach the brain, patients won't feel pain. Thus massage works by 'closing the gate' that pain impulses have to pass through [66].

Kitiya (201) studied outcomes comparison of treatment between Thai traditional massage and ultrasound in patients with cervical pain from MPS. It revealed that Thai massage enhances their ability to perform daily activities and produces greater patient satisfaction when compared with ultrasound in patients with cervical MPS [10].

Patcharin (2012) studied treatment comparison between deep friction massage and self-stretching technique of patients with myofascial pain at the upper trapezius muscle. It suggested that deep friction massage was one of technique that may be a choice to recommend for treatment; in addition to, the results revealed greater effectiveness than the self-stretching technique [67].

6. Relaxation

Massage has relieves muscle tension, spasm, and stiffness. All of these contribute to pain. Experts suggest that tense muscles are usually deprived of oxygen, because the tightness reduces blood circulation to the area. Massage

improves blood circulation, bringing with it what the muscle needs-oxygen and other forms of nourishment. The muscle then relaxes, and pain decreases [66].

Lom Plai Pattakat Disease

Lom Plai Pattakat disease can take place in all organs, such as muscles, tendons, periosteum, and fibrocartilagenous joints, except the bones.

1. Symptoms

Symptoms include spasm, swelling with nodules and taut bands or no swelling, and radiation of heat or no heat radiation.

2. Diagnosis

Diagnosis depends on the symptoms and the area where Lom Plai Pattakat occurs.

3. Treatment principles

Treatment involves relaxing the muscles to increase the blood circulation to the affected area by carrying out a basic massage or a massage of lumbar 1-5 depending on each case.

4. Recommendations

- a. Hot press
- b. Avoidance of injurious foods
- c. Exercise [68, 69]

Lom Plai Pattakat at signal four in back

Lom Plai Pattakat at signal four in back results from coagulation in the trapezius; while at signal four in back caused by stress, hard work, insufficient rest, poor posture, cervical vertebra degeneration, and accidents.

1. Symptoms

Symptoms include stiff pain in the neck, shoulders, and shoulder blades, as well as referred pain and numbness in the arms, chest, and fingers. Suffocation and chest sprain may be found.

2. Diagnosis

- a. Inability to press the chin against the chest



Figure 9 To bend the chin against the chest

- b. Stroking for TrPs
- c. Examination of the cervical area to assess the temperature and stiffness of the shoulder and blades



Figure 10 To Stroking for trigger points, temperature and stiffness of the shoulder

- d. Inability to turn the face upward. The cheekbones should be observed. Calcification is manifested by symptoms in a higher area, and cervical vertebra degeneration in a lower one.



Figure 11 To turning the face upward

- e. Pressing one ear against the shoulder, from which the range of motion and stiffness of the upper cervical muscle can be noticed.

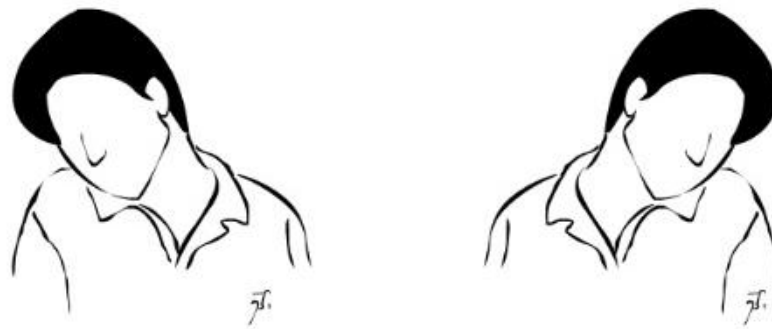
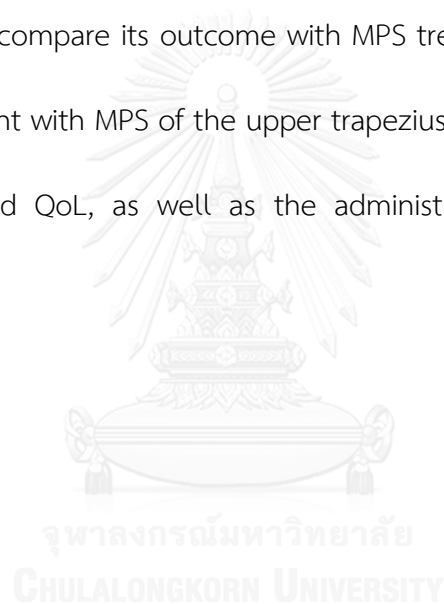


Figure 12 To pressing one ear against the shoulder

- f. Treatment procedures
 - i. Basic massage of the shoulder
 - ii. Massage on the cervical-thoracic area and the cervical area, focusing on the former.
 - iii. Massage on the omohyoid area.
- g. Recommendations
 - i. Hot press on the morning and evening for 10-15 min each
 - ii. Avoidance of injurious foods such as sticky rice, bamboo shoots, offal, and alcoholic drinks
 - iii. Exercise
 - iv. Avoidance of the cause of pain

- v. Prohibition of twisting, flexing, and tossing the head and arms harshly [68, 70, 71].

Above researches and reviewed literatures show clearly that MPS is health concern related to quality of life. There are benefits of Thai traditional massage which could be applied to MPS as an alternative treatment; still no previous researches did study the efficacy in long term and follow-up the treatment. Thus this study is to compare its outcome with MPS treatment standard to prove its effectiveness in patient with MPS of the upper trapezius using integrated assessments with CROM, PPT, and QoL, as well as the administration of pain measurement instruments, VAS.



CHAPTER III

METHODOLOGY

Research design

This study was randomized clinical control trial.

Study population

Participants were recruited from the outpatients with myofascial pain syndrome in upper and middle trapezius at the faculty of medicine, Thammasart University.

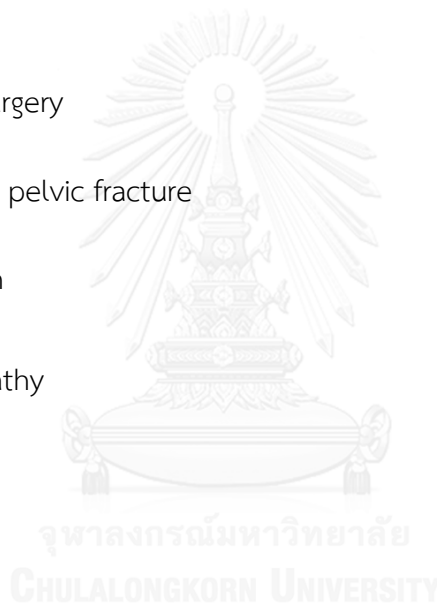
Inclusion criteria

1. Those participants who have been diagnosed by the medical specialists according to Thai Association for the Study of Pain and Travell and Simons [1, 2].
2. Age > 25 years, both sex
3. Symptom duration regularly at least 3 months
4. Trigger point of trapezius muscles
 - a. spot tenderness
 - b. taut bands

- c. tenderness within taut band
 - d. jump sign and switch response
5. The level of pain before treatment, moderate (score: 4-6)
 6. Good communication and cooperation
 7. Written Informed consent

Exclusion criteria

1. Have spinal surgery
2. Have spinal or pelvic fracture
3. Disc herniation
4. Facet arthropathy
5. Sacroiliitis
6. Pregnancy
7. Cervical spine lesion, such as radiculopathy or myelopathy
8. Systemic disease, such as arthritis or tuberculosis
9. A fever higher than 37.5 degrees Celsius
10. Hypertension (systolic greater than or equal to 140 mmHg and/or diastolic greater than or equal to 90 mmHg)



Sample size

The sample sizes were calculated according to the previous study on A comparison of outcomes of treatment with Thai tradition massage and ultrasound in patients with cervical myofascial pain syndrome [10]. The different level of pain was measured by 1- cm visual analogue scale. A standard deviation of 1.8 (σ^2) was used for the sample size estimation at the significant level of lower than 0.05 ($Z_\alpha = 1.96$), a power of test at 80 % ($Z_\beta = 0.84$) and the different results (Δ^2) of 0.8.

$$Z_\alpha = 1.96, \quad Z_\beta = 0.84, \quad \sigma^2 = 1.8, \quad \Delta^2 = 0.8$$

$$\frac{n}{\text{group}} = \frac{2(Z_\alpha + Z_\beta)^2 \sigma^2}{\Delta^2}$$

$$n = \frac{2(1.96 + 0.84)^2 (1.8)}{0.8}$$

$$n = 35.28$$

Adjusting for dropout rate of 25%, total sample sizes were 90 persons.

They were separated into two groups. Each group contained 45 patients.

Instruments of the study

- 1 A 10 – mm visual analogue scale (VAS) was used for pain intensity evaluation by the patients themselves [35].
- 2 The cervical range of motion instrument (CROM) was used according to standard operating instruction to accurately measure the patient's neck flexion, extension and lateral flexion while sitting on the chair. The device was aligned on the nose bridge and ears and was fastened at the back of the head with a strap [72-75].
- 3 The digital pressure algometer was used for pressure pain threshold (PPT) measurement. The trigger point was measured for PPT for three times and the average score was evaluated. The precision of measurement was 0.1 kg/cm^2 [73, 76-79].
- 4 The 36 – Item Short Form Health Survey (Thai version) (SF-36) was used to measure the quality of life (QoL) across eight domains, which were both physically and emotionally based. The eight domains were as follows: physical functioning; role limitations due to physical health; role limitations due to emotional problems; energy/fatigue; emotional well-being; social functioning; pain and general health [73, 76, 80].

Patients and methods

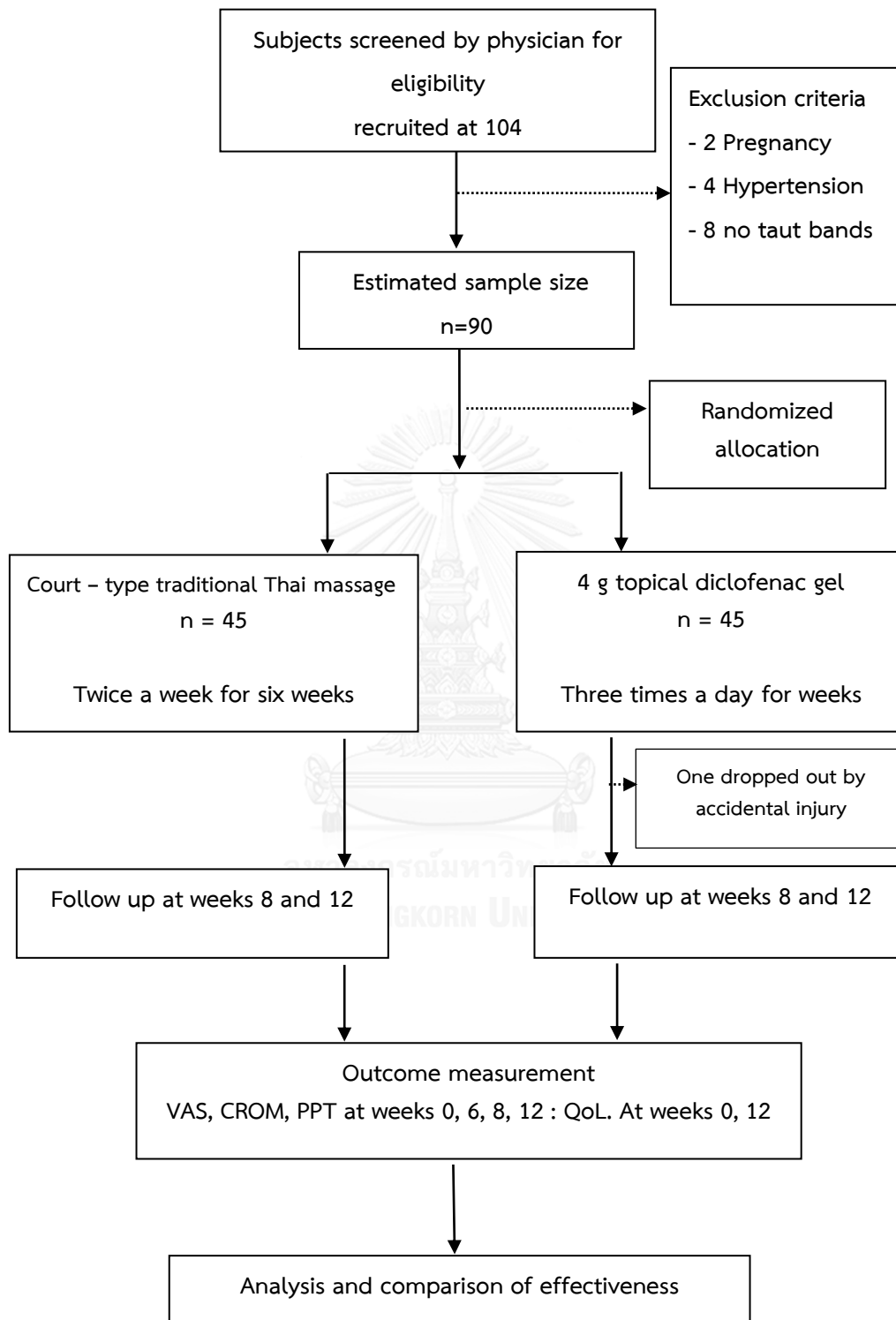


Figure 13 Participant flowchart

Discontinuation criteria

1. The participant cannot follow up for twice will be reject.
2. The participant wants to withdraw themselves.

Sampling technique

The patients were randomly assigned and picked by drawing lots into two groups. The groups were assigned by using a pre-generated random assignment scheme enclosed in envelopes.

Study intervention

After the patients underwent screening procedures using history and physical examination from a physical therapist, each of them was asked to give informed consent and followed by random assigned into one of two groups.

The treatment group (CTTM)

Patients in treatment group received a 30 – min massage twice a week for 6 weeks by one traditional Thai massage therapist (Jurairat Boonruab).

The CTTM procedures consisted of 3 steps as follows:

Traditional Thai Massage

The client is in the cross-legged sitting position or sits on a platform dangling the legs. The practitioner is in the standing posture behind the client. Figure 14 shows the lines and point for basic massage of the shoulder.

Steps 1 Basic massage of the shoulder

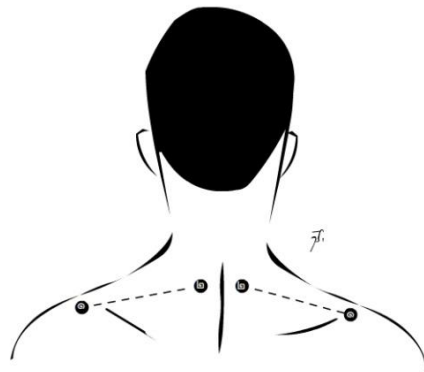


Figure 14 Lines and points for Basic massage of the shoulder

In the first round of the massage, the practitioner uses the high - standing posture, placing both thumbs at point no 1, located at the bony spine of the shoulder, and gradually move the pressing along the line to point no. 2, located at the base of neck (Figure 15).



Figure 15 Practitioner high - standing posture

In the second round of massage, the practitioner uses the medium - standing posture, and gradually presses back from point on. 2 to point no.1 (Figure 16).



Figure 16 Practitioner medium - standing posture

In the third round of the massage, do the same as for the first round, but use the low - standing posture (Figure 17).



Figure 17 Practitioner low - standing posture

Steps 2 Massage on the cervical-thoracic area and the cervical area, focusing on the former



Figure 18 Points of the cervical-thoracic area and the cervical area

Steps 3 Massage on the omohyoid area

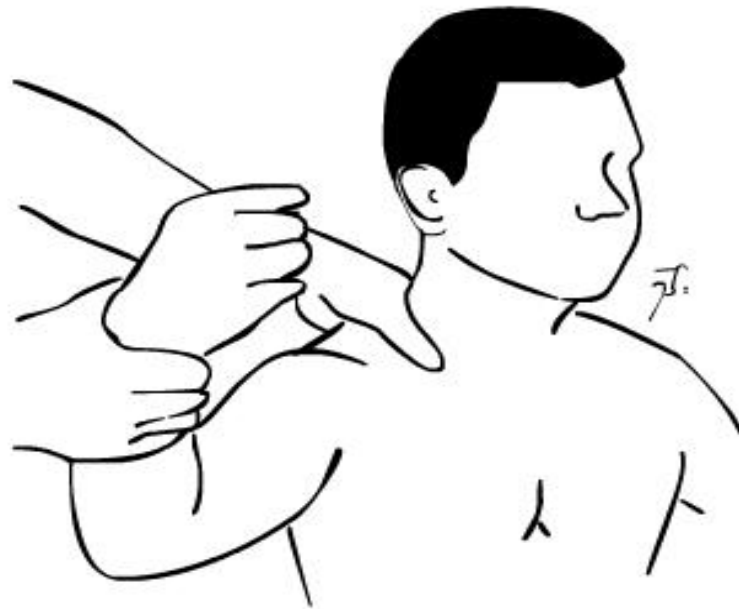


Figure 19 Points of the omohyoid area

The control group (topical diclofenac) UNIVERSITY

The control group were instructed to apply 4 g of topical diclofenac gel three times a day for 6 weeks.

Outcome measurements of the study

1. The patients evaluated their pain intensity by VAS instrument at week 0 (baseline), week 6 (completed intervention), week 8 and week 12 (follow – up after intervention).
2. The patients were assessed for their cervical flexion, extension and lateral flexion (both left and right at week 0 (baseline), week 6 (completed intervention), week 8 and week 12 (follow – up after intervention).
3. The patients were assessed for pressure pain threshold at the trigger point at week 0 (baseline), week 6 (completed intervention), week 8 and week 12 (follow – up after intervention).
4. The patients answered the SF – 36 questionnaire by themselves at week 0 (baseline) and week 12 (follow – up after intervention).
5. All collected data were analysed by the researcher (Jurairat Boonruab) at the end of the study [73, 76, 80].

Statistical analysis

Descriptive statistics

Mean, SD, 95 % CI and percentage of demographic characteristics were used for experiment.

Inferential statistics

Unpaired t-test was used to assess the demographic data of subject's characteristics between two groups and change score between two groups.

Chi-Square was nonparametric used to compare the recurrence rate between two groups.

Repeated measures ANOVA was parametric used to compare the VAS, CROM and PPT at 1st, 2nd, 3rd, and 4th.

Ethical consideration

The research proposal was approved (April 23, 2014 to April 23, 2015) by The Ethics Review Committee for Research Involving Human Research Subjects, Traditional Medicine Development Ministry of Public Health before the study.

CHAPTER IV

RESULTS

This single-blind randomized study aimed to compare the effectiveness of the court-type traditional Thai massage (CTTM) *versus* topical diclofenac in the treatment of patients with myofascial pain syndrome (MPS) in the upper and middle trapezius.

One hundred and four MPS patients were recruited from the Faculty of Medicine of Thammasart University by the simple random sampling method using a pre-generated random assignment scheme enclosed in envelopes. Fourteen patients were excluded due to pregnancy (2), hypertension (4) and no taut band (8). The remaining 90 volunteers aged 25 to 61 years with MPS as diagnosed by physicians were recruited and randomly divided into the treatment group and the control group (1:1).

The treatment group received a session of 30-minute signal point massage comprised of three steps twice a week for six weeks. The control group received topical diclofenac gel applied 4 g three times a day for six weeks. One patient in this group was excluded because an accident took place that required the administration of other types of pain relief drugs. VAS, CROM, PPT were evaluated at baseline,

at the end of intervention (week 6) and the follow – up (week 8 and week 12). SF – 36 was evaluated at baseline and week 12.

The results of the study were reported in four sections: demographic characteristics; comparison of the severity of MPS; comparison of the mean scores for visual analog scale (VAS), the cervical range of motion (CROM), and pressure pain threshold (PPT); and comparison of the mean scores for the quality of life (QoL).

Demographic characteristics

A total of 89 patients with MPS in the upper and middle trapezius were participated. As shown in Table 1, there was no statistically significant difference between two groups in terms of age, gender, height, weight, pain period, and side of pain. The mean age was 41.2 ± 8.4 years for the treatment group and 41.0 ± 8.0 years for the control group. The majority of the patients were female (97.8% for the treatment group and 86.4% for the control group) and single (55.6% for the treatment group and 63.6% for the control group). Over half of the subjects in the treatment group and the control group held a bachelor's degree (73.3% and 54.4%, respectively). Most of the patients in both groups were office workers (75.6% and 54.6%, respectively). Most of them used to get massage in alleviating their pain (60.0% and 63.6%, respectively). The pain period equated 8.2 ± 6.1 months for the treatment group and 6.8 ± 4.4 months for the control group.

Table 1 Patients' demographic characteristics

Characteristics	Treatment group	Control group	P-value
	Mean \pm SD (n=45)	Mean \pm SD (n=44)	
Age (years)	41.2 \pm 8.4	41.0 \pm 8.0	0.899 ^a
Gender			0.59 ^b
Female	44 (97.8)	38 (86.4)	
Male	1 (2.2)	6 (13.6)	
Height (cm)	156.6 \pm 6.0	157.0 \pm 8.1	0.791 ^a
Weight (kg)	56.8 \pm 8.3	59.3 \pm 10.6	0.228 ^a
Pain period (months)	8.2 \pm 6.1	6.8 \pm 4.4	0.222 ^a
Status			0.069 ^b
Single	25 (55.6)	16 (36.4)	
Couple	20 (44.4)	28 (63.6)	
Education			0.065 ^b
Lower than bachelor's	12 (26.7)	20 (45.5)	
Bachelor's	33 (73.3)	24 (54.4)	
Field of job			0.050 ^b
Office workers	34 (75.55)	24 (54.55)	
Others	11 (24.45)	20 (45.45)	
Pain treatment			0.724 ^b
None massage	18 (40.0)	16 (36.36)	
Massage	27 (60.0)	28 (63.64)	

Table 1 Patients' demographic characteristics (continued)

Characteristics	Treatment group	Control group	P-value
	Mean \pm SD (n=45)	Mean \pm SD (n=44)	
Side of pain			0.220 ^b
Right	18 (40.0)	13 (29.54)	
Left	18 (40.0)	15 (34.10)	
Bilateral	9 (20.0)	16 (36.36)	

Data presented as mean \pm deviation and percentage

^aUnpaired t-test, ^bChi-square test

VAS mean scores were shown in Table 2. Both treatment and control groups had moderate level of pain (score = 4-6) at baseline prior to the intervention then reduced to mild pain (score 1 – 3) at the end of the study as well as the follow – ups. A comparison of the effectiveness of the CTTM and topical diclofenac at baseline, week 6 treatments, and week 8 and week 12 follow-ups indicated a statistically significant decline ($p < 0.01$). For the treatment group, the mean VAS score stood at 5.13 at baseline and then dropped significantly to 0.89 at week 6 treatments and continued decreasing until week 8 and week 12 follow-ups (0.69 and 0.60 respectively). For the control group, the mean VAS score was 5.05 at baseline and then fell significantly to 2.25 at week 6 treatments and continued decreasing until week 8 and week 12 follow-ups (1.57 and 1.59 respectively). In addition, a greater decrease in MPS level of pain severity was

identified for the treatment group at all assessment time points. For instance, the mean VAS score at week 6 treatment was 0.89 for the treatment group in comparison with 2.25 for the control group.

Table 2 Comparison of pain intensity measured as VAS scores between the treatment group (CTTM) and the control group (diclofenac)

VAS	Treatment group (n=45)		Control group (n=44)		P-value
	Mean	95%CI	Mean	95%CI	
	Baseline	5.13	4.93, 5.33	5.05	
Week 6 treatment	0.89	0.54, 1.24	2.25	1.72, 2.78	0.000
Week 8 follow-up	0.69	0.39, 0.99	1.57	0.98, 2.16	0.010
Week 12 follow-up	0.60	0.31, 0.89	1.59	1.06, 2.12	0.002
P - value	0.000		0.001		

CI = confidence interval

CROM mean scores within and between groups were demonstrated in Table 3. The findings showed that both groups of patients suffered a moderate to high degree of cervical motion inability prior to the intervention but experienced considerably enhanced cervical motion ability after the intervention. A comparison of the effectiveness of the CTTM and topical diclofenac at baseline, week 6 treatments, and week 8 and week 12 follow-ups illustrated a significant improvement.

For example, for the treatment group, flexion increased from 59.98° at baseline to 68.04° at week 6 treatment, 67.09° at week 8 follow-up, and 67.07° at week 12 follow-up. Similarly, for the control group, flexion went up from 61.11° at baseline to 64.20° at week 6 treatment, 62.14° at week 8 follow-up, and 63.43° at week 12 follow-up. Additionally, a greater increase in the CROM was observed for the treatment group at all assessment time points. For instance, the mean CROM scores for flexion, extension, left lateral flexion, and right lateral flexion of the treatment group at week 6 treatment were 68.04° , 62.51° , 47.98° , and 49.42° , respectively, all higher than the results identified for the control group (64.20° , 60.68° , 45.25° and 46.55°).

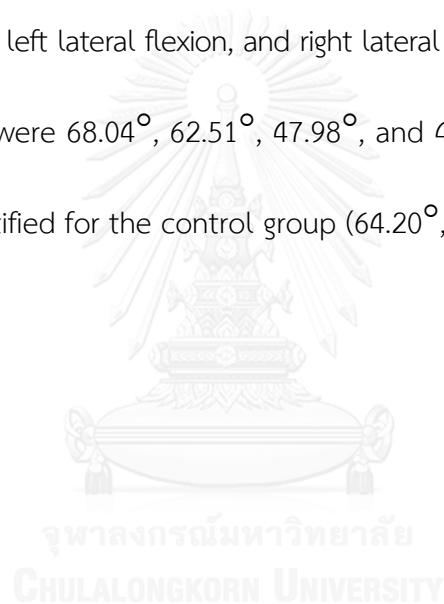


Table 3 Comparison of the cervical range of motion scores between the treatment group (CTTM) and the control group (diclofenac)

CROM	Treatment group (n=45)		Control group (n=44)		P-value
	Mean	95%CI	Mean	95%CI	
Flexion: Baseline	59.98	56.67, 63.29	61.11	57.06, 65.16	0.666
Flexion: Week 6	68.04	64.66, 71.42	64.20	60.73, 67.67	0.117
Flexion: Week 8	67.09	63.95, 70.23	62.14	58.22, 66.06	0.053
Flexion: Week 12	67.07	63.83, 70.31	63.43	59.71, 67.13	0.145
P - value	0.000		0.190		
Extension: Baseline	61.78	57.71, 65.85	58.84	54.73, 63.31	0.335
Extension: Week 6	62.51	58.84, 66.18	60.68	56.61, 64.75	0.056
Extension: Week 8	66.24	62.86, 69.62	60.89	57.16, 64.62	0.036
Extension: Week 12	67.60	63.93, 71.27	61.59	57.83, 65.35	0.025
P - value	0.000		0.078		
Lateral left: Baseline	44.71	41.94, 47.48	44.18	41.30, 47.06	0.792
Lateral left: Week 6	47.98	45.20, 50.76	45.25	42.68, 47.86	0.157
Lateral left: Week 8	49.73	46.91, 52.55	46.50	44.24, 48.76	0.078
Lateral left: Week 12	50.27	47.49, 53.05	47.41	44.92, 49.90	0.129
Lateral right: Baseline	46.38	42.89, 49.87	44.59	41.93, 47.25	0.418
Lateral right: Week 6	49.42	46.87, 51.97	46.55	43.53, 49.57	0.150
Lateral right: Week 8	50.58	47.91, 53.25	45.95	43.42, 48.48	0.014
Lateral right: Week 12	51.16	48.61, 53.71	48.77	46.19, 51.35	0.193
P - value	0.000		0.093		

CI = confidence interval

PPT mean scores were shown in Table 4. At baseline, PPT in the treatment group was lower than the control group especially PPT in the right side ($p < 0.01$). After intervention, the significant increase in PPT was found in both left and right sides in the treatment group ($> 2 \text{ kg/cm}^2$). PPT in the control group elevated at the lower rate ($< 0.5 \text{ kg/cm}^2$). At 12 – week follow – up, PPT in both treatment and control groups still were higher than at the baseline. The treatment group showed better increasing in PPT ($> 2 \text{ kg/cm}^2$ in both sides) than the control group ($\leq 1 \text{ kg/cm}^2$ in both sides).



Table 4 Comparison of pressure algometry measured with PPT scores between the treatment groups (CTTM) and the control group (diclofenac)

PPT	Treatment group (n=45)		Control group (n=44)		P-value
	Mean (kg/cm ²)	95%CI	Mean (kg/cm ²)	95%CI	
Left: Baseline	3.80	2.83, 4.77	4.38	3.20, 5.56	0.451
Left: Week 6	5.85	4.25, 7.47	4.65	3.41, 5.89	0.244
Left: Week 8	5.78	4.16, 7.40	4.94	3.65, 6.93	0.420
Left: Week 12	6.93	5.39, 8.47	4.71	3.44, 5.98	0.029
Right: Baseline	3.62	2.74, 4.50	5.70	4.67, 6.73	0.003
Right: Week 6	6.52	4.94, 8.10	6.01	4.92, 7.10	0.598
Right: Week 8	7.16	5.59, 8.73	6.45	5.31, 7.59	0.463
Right: Week 12	5.90	4.26, 7.54	6.77	5.55, 7.99	0.404
P - value	0.000		0.469		

CI = confidence interval

Comparison of QoL

The linear subscale scores of each domain in the short form quality of life questionnaire (SF-36) ranged from 0 to 100 with higher scores representing better health status or functioning. The subscale scores were summarized into the physical component score (PCS) and the mental component score (MCS) by calculating the weighted sums of the questions in their respective sections. According to overall PCS and MCS scores, a comparison of the effect of the CTTM and topical diclofenac before and after the treatment as well as between the treatment group and the control group showed a statistically significant improvement ($p < 0.01$). For the treatment group, PCS and MCS scores increased significantly from 47.52 to 68.00 and from 40.78 to 66.34, respectively. For the control group, PCS and MCS scores went up from 56.70 to 59.60 and from 40.51 to 50.60, respectively. When the two groups were compared, a greater improvement in overall PCS and MCS scores was found for the treatment group (Table 5).

When each of the SF-36 domains was examined more closely, it was found that the effect of the CTTM was statistically significant for all the domains ($p = 0.01$), while that of topical diclofenac was not statistically significant for physical functioning, vitality, emotional role functioning, and mental health ($p > 0.05$). A comparison between groups indicated a greater improvement in the treatment group than in the control group, particularly for social functioning (89.17 vs. 78.41),

bodily pain (83.11 vs. 73.16), general health perceptions (67.96 vs. 62.64), and mental health (74.89 vs. 64.77). The results were demonstrated in Table 6.

Table 5 Comparison of PCS and MCS scores

Scores/group	Treatment group		Control group		<i>P</i> -value
	Mean	95% CI	Mean	95% CI	
PCS					
Week 0	47.52	40.46, 54.57	56.70	49.53, 63.80	0.073
Week 12	68.00	61.16, 74.84	59.60	52.68, 66.52	0.090
<i>P</i>-value	<0.001		<0.007		
MCS					
Week 0	40.78	33.92, 47.65	40.51	33.57, 47.45	0.955
Week 12	66.34	60.13, 72.55	50.60	44.33, 56.88	0.001
<i>P</i>-value	<0.001		<0.002		

PCS=Physical Component Summary

MCS=Mental Component Summary

Table 6 Comparison of mean scores for each SF-36 domain

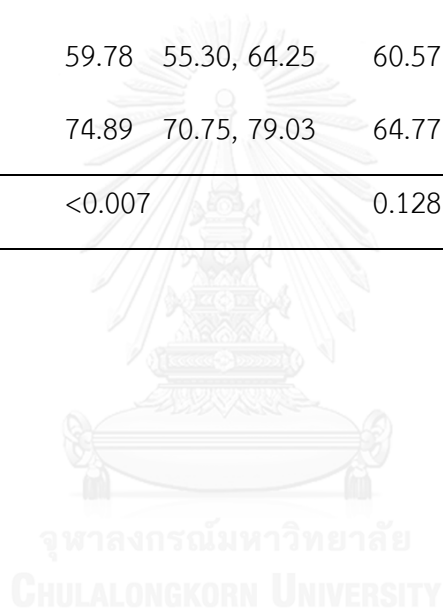
SF-36 domains/group	Treatment group		Control group		<i>P</i> -value
	Mean	95% CI	Mean	95% CI	
Physical functioning (PF)					
Week 0	72.33	66.04, 78.63	82.50	76.13, 88.87	0.027
Week 12	89.44	84.66, 94.23	87.16	82.32, 92.00	0.506
<i>P</i>-value	<0.001		0.069		

Table 6 Comparison of mean scores for each SF-36 domain (continued)

SF-36 domains/group	Treatment group		Control group		P-value
Physical role functioning (PR)					
Week 0	60.42	54.41, 66.43	63.21	57.13, 69.29	0.518
Week 12	73.06	66.28, 79.84	69.89	63.03, 76.74	0.515
P-value	<0.001		<0.001		
Social functioning (SF)					
Week 0	68.33	62.74, 73.92	62.22	56.56, 67.87	0.130
Week 12	89.17	83.69, 94.64	78.41	72.87, 83.94	0.007
P-value	<0.001		<0.001		
Bodily pain (BP)					
Week 0	42.98	39.14, 46.81	44.23	40.35, 48.10	0.650
Week 12	83.11	77.11, 89.11	73.16	67.09, 79.23	0.023
P-value	<0.001		<0.001		
General health perceptions (GH)					
Week 0	53.38	48.42, 58.33	56.82	51.81, 61.83	0.335
Week 12	67.96	63.27, 72.64	62.64	57.90, 67.37	0.116
P-value	<0.001		<0.014		
Vitality (VT)					
Week 0	56.94	52.59, 61.30	57.10	52.70, 61.51	0.960
Week 12	71.67	67.76, 75.58	59.80	55.85, 63.76	<0.001
P-value	<0.001		0.209		

Table 6 Comparison of mean scores for each SF-36 domain (continued)

SF-36 domains/group	Treatment group		Control group		P-value
Emotional role functioning (ER)					
Week 0	61.11	54.09, 68.13	62.88	55.78, 69.98	0.726
Week 12	74.81	67.28, 82.35	70.08	62.46, 77.69	0.382
P-value	<0.003		0.062		
Mental health (MH)					
Week 0	59.78	55.30, 64.25	60.57	56.04, 65.10	0.806
Week 12	74.89	70.75, 79.03	64.77	60.59, 68.96	0.001
P-value	<0.007		0.128		



CHAPTER V

DISCUSSION AND CONCLUSION

The objective of this study is to compare the effectiveness of the court-type traditional Thai massage (CTTM) *versus* diclofenac gel in treating patients with myofascial pain syndrome (MPS) in the upper and middle trapezius, using a single-blind randomized controlled trial. The data were collected through self-evaluate of pain intensity using visual analog scale (VAS), measurement of the cervical range of motion (CROM) and pressure pain threshold (PPT). Eighty-nine patients completely participated in the research.

Myofascial pain syndrome (MPS) commonly affects office workers. Taking pharmacological approaches may be effective, but it can result in undesirable complications. For example, the administration of NSAIDs may attenuate the effectiveness of anti-hypersensitive medications used to treat MPS in hypersensitive patients suffering from cardiovascular disease or even increase risks of adverse events, and may lead to increased nephropathy risks in diabetic patients [81-83]. Despite their risks, NSAIDs are often prescribed for musculoskeletal pain treatment [84]. Therefore, there is need to develop alternative therapy that not only effectively treats MPS but also reduces adverse effects.

As a result of massage, superficial blood vessels are dilated and blood circulation is enhanced. Administered in healthy adults, forceful massage not only promotes local blood flow but also increases cardiac stroke volume. In comparison with gentle pressure, forceful massage has more long-lasting effects, and is thus an effective therapeutic method. Improved blood circulation entails improvement in muscle fatigue due to less spasm in muscle fibres [66].

Past researches suggested that venous return and cardiac stroke volume could be promoted by deep massage. In those studies, external compression was applied in the assessment of the effects of massage, and it was found that the application of a maximal pressure of 40 mmHg, increased at 8 mmHg with a 1-min interval between each cycle, was able to expel 80 ml blood per min from lower leg veins. Similar results on venous flow might be achieved by firm manual massage [66]. Deep massage may contribute to muscle damage at a level that increases the serum concentrations of myoglobin and several enzymes, including glutamic oxaloacetic transaminase, creatine kinase, and lactate dehydrogenase. This makes diagnosis or evaluation of therapeutic effectiveness more difficult, especially in manual massage.

Massage alleviates extreme discomfort caused by muscle spasm and enhances muscle functions. For instance, light massage after exercise helps to reduce lactate concentrations in muscle cells and is proven to be more effective than rest or a traditional warm-down regime.

Although massage has been applied for pain alleviation for a long time, a physiological explanation for its mechanism has only recently been offered. According to the gate control theory, pain impulses travel through the spinal cord to the brain, where the impulses are perceived as pain. Rubbing during massage transmits other impulses along the same nerves than pain, reducing the amount of pain signals reaching the brain and thus the pain. In other words, the gate through which pain impulses run is closed.

Massage alleviates muscle tension, spasm, and stiffness, all of which cause pain by improving blood circulation, which in turn boosts oxygen delivery to muscles. As muscles are relaxed, pain is reduced.

Eighty-nine patients with myofascial pain syndrome (MPS) in the upper and middle trapezius at the Faculty of Medicine, Thammasat University, received either the court-type traditional Thai massage (CTTM) or pharmacological treatment with topical diclofenac gel during April 23, 2014 to April 23, 2015. In terms of their demographic characteristics, including age, gender, height, weight, pain period, and side of pain, the two groups of subjects were not statistically significantly different. As regards their occupations, most of the participants were office workers, remaining in a sitting or standing posture for a long time and thus suffering from MPS in the upper and middle trapezius.

The parameters of the study included a visual analog scale (VAS), an instrument measuring patients' perception of pain along a continuum of values for which direct measurement is difficult; the cervical range of motion (CROM), a procedure used to measure the range of motion of patients' neck and to indicate the effectiveness of treatment for musculoskeletal disorders; pressure pain threshold (PPT), an algometry technique used to identify the level of patients' ability to tolerate pain; and the Short Form 36 Quality of Life (SF-36 QoL), a questionnaire used to measure patients' quality of life across eight physical and emotional domains.

The findings indicated that MPS resulted from remaining in a sitting or standing posture for a long time, thereby causing severe pain. Although diclofenac gel and the CTTM were both effective in reducing pain, only the latter was able to enhance muscle flexibility and blood circulation as a result of its procedure involving signal point pressure. Thus, muscle fatigue and stiffness were drastically reduced. With regards to the CROM, the flexion, extension, left lateral flexion, and right lateral flexion of the treatment group were significantly better than those of the control group. This reflected enhanced muscle flexibility and reduced stiffness in the upper and middle trapezius. As for PPT, both the CTTM and diclofenac gel increased the subjects' ability to withstand pain, but the CTTM was found to be more potent in reducing muscle stiffness and increasing muscle movement. Finally, as regards the

SF-36 QoL, the treatment group and the control group both suffered from poor life quality prior to the treatment. After the treatment, both groups reported improving quality of life in terms of physical and mental health components. However, the treatment group fared better for the latter, possibly because of their better muscle functions.

Similar results have been reported in a number of other studies. For example, Junwibool and Fakkham [85] examined whether the CTTM was effective in treating patients suffering from MPS. Applying Johnson's two components scale as the main research instrument, they discovered that CTTM therapy contributed to a statistically significant reduction in the pain experienced by the subjects. In addition, Jampangern [86] investigated the effectiveness of TTM in treating patients with musculoskeletal disorders. Employing the SF-36 health survey and the VAS as the main data collection instruments, she found that traditional Thai massage led to a statistically significant improvement in the patients' health-related quality of life (HRQoL) in all domains and a statistically significant decline in the level of pain intensity. Furthermore, Kumnerddee [87] compared the effectiveness of TTM and Chinese acupuncture in treating patients suffering from myofascial back pain. Collecting data with the Thai version of McGill pain questionnaire, the VAS, and PPT, he found that TTM resulted in a statistically significant fall in McGill, VAS, and PPT scores, whereas Chinese acupuncture also led to a statistically significant decrease in the first two

indicators but not PPT. Moreover, Kowitthayanon and Thaechasubamorn [10] evaluated the effectiveness of TTM in treating MPS patients in comparison with ultrasound therapy. Applying CROM measurement, the VAS, and the functional rating index (FRI) as the research instruments, they found that both types of treatment resulted in a statistically significant improvement in the CROM and a statistically significant fall in the VAS and FRI. They also discovered that the effectiveness of TTM and ultrasound therapy did not differ significantly in terms of CROM and VAS measurements, but TTM contributed to a statistically greater decrease in the FRI than ultrasound therapy.

An analysis of some of the studies cited above reveals interesting findings regarding the therapeutic procedures that will ensure the effectiveness of TTM. In Jampangern's study, [86]. TTM was carried out five times over a 15-day period with each session being two to three days apart and lasting 45 minutes. In Kumnerddee's investigation, [87] TTM was performed five times over a 10-day period with each session being two days apart. In Kowitthayanon and Thaechasubamorn's study, [10] TTM was conducted 12 times over a four-week period with each session being carried out every Monday, Wednesday, and Friday. In this research, the CTM was performed over a 6-week period with each session being a week apart and lasting 30 minutes. It can be concluded, therefore, that TTM should be provable effective when conducted at least five times over a period of at least ten days with

each session being continued for least 30 minutes. However, the results of more studies are needed in order to arrive at a conclusive generalization regarding effective procedures.

Despite the potential effectiveness of TTM, a review of the literature locates two studies presenting mixed results. Leelayuwat *et al.* [88] assessed the physiological effects of TTM on muscle pain and related complications. Using the VAS and substance P measurement to collect the data, Leelayuwat *et al.* [88] [88] discovered that after the treatment, VAS scores for the treatment group and the control group did not differ significantly. Surprisingly, substance P measurement indicated a statistically significant fall in substance P of the subjects in the control group, but not those in the treatment group. Sitikaipong *et al.* [89] compared the effectiveness of the CTTM and diclofenac gel in treating patients with shoulder pain. After assessing the patients' angle movement and PPT, they found that the CTTM contributed to significantly better neck and shoulder muscle flexibility but that diclofenac resulted in greater shoulder pain endurance for both sides. Such mixed results may be attributed to the specific massage procedures administered to the patients and their physical characteristics.

Conclusion

The findings in the present study strongly suggest that traditional Thai massage is likely an effective and safe treatment option for MPS in the upper and

middle trapezius, particularly in relieving pain severity levels and improving QoL. The results also point to the superiority of traditional Thai massage over topical medication such as diclofenac gel.

Benefits of the study

1. The results of this study can provide CTTM guidelines for the management of patients with MPS in the middle and upper trapezius.

2. The findings may contribute to the increased popularity of alternative therapy, especially the CTTM, in the treatment of patients with MPS in the middle and upper trapezius. Ultimately, alternative therapy may become a more preferred option than medicinal approaches as it involves less undesirable or adverse risks.

Recommendations

A number of issues remain to be answered in further research, including the effectiveness of TTM in treating patients experiencing pain in other body parts, such as back or leg pain, the frequency and duration for which TTM will bring about the most desirable results, the factors that affect the effectiveness of TTM, the specific mechanism by which TTM alleviate pain experienced by MPS patients, and the effectiveness of TTM in comparison with other types of treatment. All this will cast light on the application of alternative medicine, specifically TTM and the CTTM, in pain treatment in order to reduce reliance on the use of medication and to promote the role of such non-medicinal approaches in the future.

Ethics Committee for Research in Human Subjects in the Fields of
 Thai Traditional and Alternative Medicine
 Department for Development of Thai Traditional and Alternative Medicine

.....
 Title of Project : Effectiveness of Court-type Traditional Thai Massage versus Topical
 Diclofenac for Myofascial Pain Syndrome of Upper Trapezius

Principle Investigator : Miss Jurairat Boonruab

Responsible Organization : Department of Applied Thai Traditional Medicine,
 Faculty of Medicine,
 Thammasat University, Pathumthani, Thailand

The Ethics Committee for Research in Human Subjects in the Fields
 of Thai Traditional and Alternative Medicine had reviewed the research proposal.
 Concerning both on scientific and ethical issues, the committee has approved for the
 implementation of the research study mentioned above.



(Dr.Pramote Stienrut MD.)

Secretary



(Dr.Vichai Chokevivat MD.)

Chairman

Date of First Meeting : November 28,2013

Date of Approval : April 23,2014 to April 23,2015

1

เลขที่		
1	2	3

แบบสอบถาม

“ประสิทธิภาพการนวดไทยสายราชสำนักกับยาทาโคโลสิเทเนกในผู้ป่วยปวดกล้ามเนื้อบ่าส่วนบน”

แบบสอบถามชุดนี้ ประกอบด้วย 4 ส่วน ดังนี้

ส่วนที่ 1 แบบบันทึกข้อมูลทั่วไป

ส่วนที่ 2 แบบประเมินการวินิจฉัยโรคปวดบ่า (สำหรับแพทย์ตอบ)

ส่วนที่ 3 แบบประเมิน

- แบบประเมินอาการปวด (Pain Intensity : VAS)

-แบบประเมินการวัดองศาการเคลื่อนไหวของคอ

(Cervical Range of Motion(CROM) Measurements)

-แบบประเมินการวัดความความตึงตัวของกล้ามเนื้อผู้สีกกดเจ็บ(Algometer Pressure Pain Threshold (PPT))

ส่วนที่ 4 แบบประเมินสุขภาพ

คำชี้แจง การประเมินนี้เป็นส่วนหนึ่งของการศึกษาผลของการนวดไทยราชสำนักในการบำบัดโรคปวดบ่าส่วนบนเปรียบเทียบกับผลการรักษาทางแผนปัจจุบัน ด้วยวิธีการใช้ยาด้านการอักเสบ ทั้งนี้ เพื่อให้การประเมินผลและวิเคราะห์ ได้ผลใกล้เคียงความจริงมากที่สุด ขอให้ท่านปฏิบัติตนดังนี้ โปรดตอบคำถามแต่ละข้อให้ตรงกับความเป็นจริง ตอบทุกข้อทุกตอน หากบางข้อไม่ตรงตามความเห็นของท่านให้เลือกที่ใกล้เคียงมากที่สุด อันจะนำไปใช้เป็นแนวทางในการพัฒนาการบริการด้านการแพทย์แผนไทยให้ก้าวหน้าและเป็นประโยชน์แก่ประชาชนให้มากยิ่งขึ้น

ส่วนที่ 2 การตรวจสัญญาณชีพ (Vital Sign)

1. วัดอุณหภูมิกาย องศาเซลเซียส
2. วัดความดันโลหิต มิลลิเมตรปรอท
3. วัดอัตราการหายใจ ครั้ง/นาที
4. วัดการเต้นของหัวใจ ครั้ง/นาที

การวินิจฉัยโรคปวดกล้ามเนื้อบ่าส่วนบน (สำหรับแพทย์)

วันที่.....เดือน.....พ.ศ.....

ป่วยโรคปวดกล้ามเนื้อบ่าส่วนบน (Myofascial pain syndrome)

() ขวา () ซ้าย () ทั้งสองข้าง

	ผู้ป่วยได้รับการวินิจฉัยโรคปวดกล้ามเนื้อบ่าส่วนบน	ใช่	ไม่ใช่
Inclusions criteria	1.อายุตั้งแต่ 25 ปี ถึง 65 ปี อายุจริง.....ปี		
	2.มีอาการปวด ไม่น้อยกว่า 3 เดือน (symptom duration regularly 3 months)		
	3.มีจุดปวดกล้ามเนื้อบ่าส่วนบน (trigger point of upper Trapezius muscles) - จุดกดเจ็บ (spot tenderness) - พบก้อน (taut bands) - เป็นจุดปวดที่ไวต่อการกระตุ้น (hyperirritable spot) - กดที่จุดสะดุ้งและปวดร้าว (jump sign and referred pain)		
Exclusions criteria	1.ผู้ป่วยที่เป็นหญิงอยู่ในช่วงตั้งครรภ์		
	2.ผู้ป่วยมีกระดูกหักหรือมีอุบัติเหตุที่ คอ หลัง ไหล่		
	3.ผู้ป่วยมีอาการชา ร้าวลงแขนจากการกดทับของเส้นประสาท		
	4.ผู้ป่วยทานยาที่เป็นสเตอรอยด์ ขณะเข้าร่วมโครงการ		
	5.ผู้แพ้ยาสเตอรอยด์		
	6.ผู้ป่วยได้รับการรักษาด้วยการฝังเข็ม, ทำกายภาพบำบัด ขณะเข้าร่วมโครงการ		

(.....)

แพทย์ผู้ประเมิน

ส่วนที่ 3 แบบประเมิน

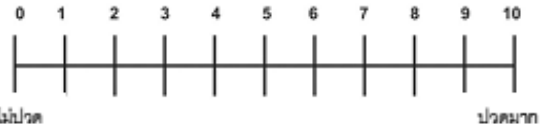
อาการปวด (Pain Intensity : VAS)

ก่อนการรักษา อาการปวด 1-3 ปวดน้อย , 4-6 ปวดปานกลาง , 7-10 ปวดมาก

(Thai Association for the study of pain 2552)

ครั้งที่ ที่	Date	กรรณิกา X ลงบนเส้นที่แสดงถึงระดับอาการปวดโดยเฉลี่ยในช่วง 1 วัน ที่กำหนด	VAS
/...../.....		

หลังการรักษา อาการปวด 1-3 ปวดน้อย , 4-6 ปวดปานกลาง , 7-10 ปวดมาก

ครั้งที่ ที่	Date	กรรณิกา X ลงบนเส้นที่แสดงถึงระดับอาการปวดโดยเฉลี่ยในช่วง 1 วัน ที่กำหนด	VAS
/...../.....		

5

การวัดองศาการเคลื่อนไหวของกล้ามเนื้อบ่า(Cervical Range of Motion(CROM) Measurements)

-การวัดองศาการเคลื่อนไหวของกล้ามเนื้อบ่า ในท่าก้มหน้า เงยหน้า เอียง (ซ้าย ขวา) โดยใช้เครื่องมือวัด

การเคลื่อนไหวของคอ Cervical Range of Motion(CROM) Measurements เปรียบเทียบก่อนหลังขนาดพื้นที่

การก้มหน้า

ครั้งที่	Date	Flexion (องศา)	
		Pre-test	Post-test
/...../.....		

การเงยหน้า

ครั้งที่	Date	Extension (องศา)	
		Pre-test	Post-test
/...../.....		

การเอียงด้านซ้าย

ครั้งที่	Date	Lateral Flexion (องศา)			
		Pre-test		Post-test	
/...../.....	LL	RT.	Lt.	RT.

แบบประเมินการวัดความรู้สึกกดเจ็บ(Algometer Pressure Pain Threshold (PPT))

-การวัดความรู้สึกการกดเจ็บ เป็นการวัดความรู้สึกเริ่มต้นที่กดเจ็บ ณ จุดกดเจ็บที่มีมากที่สุด โดยใช้ Algometer Pressure Pain Threshold (PPT) เปรียบเทียบก่อนหลังขนาดหินที่

ครั้งที่	Date	PPT (kg/cm ²)	
		Pre-test	Post-test
/...../.....		

ส่วนที่ 4 คำถามแบบสำรวจสุขภาพ (สำหรับอาสาสมัคร)

โปรดทำเครื่องหมาย ในช่องคำตอบที่เหมาะสมและเป็นจริงกับตัวท่านมากที่สุด

1. โดยทั่วไปคุณพูดได้ว่า สุขภาพของคุณ เป็นอย่างไร?
 - ดีเยี่ยม
 - ดีมาก
 - ดี
 - ปานกลาง
 - ไม่ดี
2. เปรียบเทียบกับเมื่อหนึ่งปีที่แล้ว คุณพูดได้ว่าสุขภาพของคุณ โดยทั่วไปตอนนี้ เป็นอย่างไร?
 - ดีมากกว่าหนึ่งปีที่แล้ว
 - บางครั้งดีกว่าหนึ่งปีที่แล้ว
 - เหมือนหนึ่งปีที่แล้ว
 - บางครั้งแย่กว่าหนึ่งปีที่แล้ว
 - แย่กว่าหนึ่งปีที่แล้ว
3. คำถามต่อไปนี้เป็นการเกี่ยวข้องกับกิจกรรมที่คุณทำในแต่ละวัน คุณคิดว่า สุขภาพของคุณ ในตอนนี้ มีผลทำให้คุณไม่สามารถทำกิจกรรมต่อไปนี้ได้อย่างเต็มที่ หรือไม่ ถ้ามีผลมีแค่ไหน?

กิจกรรม	ทำได้น้อยลงมาก	ทำได้บ้าง	ทำได้เต็มที่
3.1 กิจกรรมที่ต้องใช้แรงมาก เช่น การวิ่ง ยกของหนัก การร่วมเล่นกีฬาที่ต้องออกแรงมาก			
3.2 กิจกรรมที่ต้องใช้แรงพอสมควรเช่น ขี่จักรยานด้วยไม้จูงขึ้น เดินเร็วๆ หรือเดินเล่น ใดๆ			
3.3 ยกหรือถือของเมื่อไปจ่ายตลาด			
3.4 การขึ้นสะพานทั่วๆไป			
3.5 การขึ้นสะพานในแต่ละครั้ง			
3.6 การงอ การบิด การเอียงเข่า			
3.7 การเดินมากกว่าหนึ่งกิโลเมตร			
3.8 การเดินทั่วๆไป			
3.9 การเดินหนึ่งกิโลเมตร			
3.10 อานม้าหรือแต่งตัวสวมเสื้อตัวเอง			

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4. ในช่วงหนึ่งเดือนที่ผ่านมา สุขภาพของคุณ ทำให้คุณมีปัญหาต่อไปนี้ ในการทำงานหรือกิจวัตรประจำวันต่างๆของคุณหรือไม่?

	รู้สึก ตลอดเวลา	รู้สึก มากที่สุด	รู้สึก บาง เวลา	รู้สึก บ้าง เล็กน้อย	ไม่ รู้สึก
4.1 ทำงานหรือกิจกรรมต่างๆ ได้ ไม่นานเท่าที่เคยทำ					
4.2 ทำงานเสร็จ ได้น้อยกว่าที่อยากทำ					
4.3 ไม่สามารถทำงานหรือกิจกรรมบางอย่างได้อย่างที่ เคยทำ					
4.4 สามารถทำงานหนักหรือกิจกรรมเพิ่มได้					

5. ในช่วงหนึ่งเดือนที่ผ่านมา ปัญหาทางอารมณ์ของคุณ (เช่น รู้สึกหงุดหงิด หรือวิตกกังวล) ทำให้คุณมี

ปัญหาในการทำงานหรือกิจกรรมปกติประจำวัน หรือไม่?

	รู้สึก ตลอดเวลา	รู้สึก มากที่สุด	รู้สึก บาง เวลา	รู้สึก บ้าง เล็กน้อย	ไม่รู้สึก
5.1 ทำงานหรือกิจกรรมต่างๆ ได้ ไม่นานเท่าที่เคยทำ					
5.2 ทำงานเสร็จ ได้น้อยกว่าที่อยากทำ					
5.3 ทำงานหรือกิจกรรมต่างๆ โดยไม่มีระดับหรืออย่าง ที่เคยทำ					

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6. ในช่วงหนึ่งเดือนที่ผ่านมา สุขภาพกายหรือปัญหาทางอารมณ์ของคุณ กระทบการทำกิจกรรมทางสังคมตามปกติของคุณ เช่น การพบปะสังสรรค์กับครอบครัว เพื่อนฝูง หรือเพื่อนบ้าน มากน้อยแค่ไหน?

ไม่รบกวนเลย รบกวนเล็กน้อย รบกวนปานกลาง รบกวนมาก รบกวนมากเป็นอย่างยิ่ง(สุดขีด)

7. ในช่วงหนึ่งเดือนที่ผ่านมา คุณมีอาการปวดบ่าส่วนบน รุนแรงแค่ไหน?

ไม่ปวด ไม่ปวดรุนแรง(น้อยมาก) ไม่ปวดรุนแรง ปวดปานกลาง ปวดรุนแรง ปวดรุนแรงมากที่สุด

8. ในช่วงหนึ่งเดือนที่ผ่านมา อาการปวดบ่าของคุณ กระทบการทำงานตามปกติของคุณ แค่ไหน?

ไม่รบกวนเลย รบกวนเล็กน้อย รบกวนปานกลาง รบกวนมาก รบกวนมากเป็นอย่างยิ่ง(สุดขีด)

9. ในช่วงหนึ่งเดือนที่ผ่านมา คุณมีความรู้สึกต่อไปนี้ บ่อยแค่ไหน?

	รู้สึก ตลอดเวลา	รู้สึก มากที่สุด	รู้สึก บางเวลา	รู้สึก บ้าง เล็กน้อย	ไม่รู้สึก
9.1 คุณรู้สึกมีจิตวิจวาทระปรึกระปร่าหรือไม่					
9.2 คุณรู้สึกวิตกกังวลหรือไม่					
9.3 คุณรู้สึกหาคู่เสร้างมากจนไม่มีอะไรทำให้คุณรู้สึกดีขึ้นได้หรือไม่					
9.4 คุณรู้สึกสงบสบายหรือไม่					
9.5 คุณรู้สึกมีพลังมากหรือไม่					
9.6 คุณรู้สึกหมดกำลังใจและเหงหงอหรือไม่					
9.7 คุณรู้สึกอ่อนส้าหรือไม่					
9.8 คุณรู้สึกมีความสุขหรือไม่					
9.9 คุณรู้สึกอ่อนเพลีย เหน็ดเหนื่อยหรือไม่					

10. ในช่วงหนึ่งเดือนที่ผ่านมา สุขภาพกายหรือปัญหาทางอารมณ์ของคุณ กระทบการทำกิจกรรมทางสังคมตามปกติ

ของคุณ เช่น การพบปะสังสรรค์กับครอบครัว เพื่อนฝูง หรือเพื่อนบ้าน บ่อยแค่ไหน?

ตลอดเวลา มาก บางเวลา เล็กน้อย ไม่มี

11. ข้อความแต่ละข้อความต่อไปนี้ ถูกต้อง หรือ ไม่ถูกต้อง มากน้อยแค่ไหนสำหรับคุณ?

	ชัดเจน มากที่สุด	ชัดเจน มาก	ชัดเจน ปาน กลาง	ชัดเจน น้อย	ไม่ ชัดเจน
11.1 ฉันดูเหมือนจะไม่สบายกว่าคนอื่น					
11.2 ฉันมีสุขภาพแข็งแรงดีพอๆกับคนอื่นๆ ที่ฉันรู้จัก					
11.3 ฉันคิดว่าสุขภาพของตัวเองจะแย่ลง					
11.4 ฉันคิดว่าสุขภาพของตัวเองดีเยี่ยม					

ขอบคุณมากค่ะ

REFERENCES

1. Travell J, Simons D, and Simons L, *Myofascial pain and dysfunction*. 1999, Baltimore: Williams & Wilkins.
2. Travell J, Simons D, and Simons L, *Myofascial pain and dysfunction*. 1983, Baltimore: Williams & Wilkins.
3. Desai M, Saini V, and Saini S, *Myofascial Pain Syndrome: A Treatment Review*. Pain Therapy, 2013. **2**(1): p. 21-36.
4. Huguenin L, *Myofascial trigger points: the current evidence*. Physical Therapy in Sport, 2004. **5**(1): p. 2-12.
5. New York Jacobsen S, Danneskiold-Samsøe B, and Lund B, *Musculoskeletal pain, myofascial pain syndrome, and the fibromyalgia syndrome*. 1993, New York: Haworth Medical Press.
6. Simons D and Dommerholt J, *Myofascial Trigger Points and Myofascial Pain Syndrome: A Critical Review of Recent Literature*. Journal of Manual & Manipulative Therapy., 2006. **14**(4): p. 125E-171E.
7. Saxena A, et al., *Myofascial Pain Syndrome: An Overview*. . Journal of Pain & Palliative Care Pharmacotherapy, 2015. **29**(1): p. 16-21.
8. P., P., *Clinical practice guidelines for myofascial and fibromyalgial pain syndromes*. 2009, Bangkok: Amarin Printing and Publishing PCL.
9. Fernández-de-las-Peñas C, Alonso-Blanco C, and Miangolarra JC, *Myofascial trigger points in subjects presenting with mechanical neck pain: A blinded, controlled study*. Manual Therapy, 2007. **12**(1): p. 29-33.
10. Kitiya Kowithayanon and P. Thaechasubamorn, *A comparison of outcomes of treatment with Thai traditional massage and ultrasound in patients with cervical myofascial pain syndrome*. Journal of Thai Traditional and Alternative Medicine, 2010. **8**: p. 179-189.
11. Majlesi J and U. H., *High-power pain threshold ultrasound technique in the treatment of active myofascial trigger points: a randomized, double-blind,*

- case-control study*. Archives of Physical Medicine and Rehabilitation. , 2004. **85**(5): p. 833-836.
12. de las Peñas C, et al., *Manual therapies in myofascial trigger point treatment: a systematic review*. . Journal of Bodywork and Movement Therapies, 2005. **9**(1): p. 27-34.
 13. Mogren, I.M. and A.I. Pohjanen, *Low back pain and pelvic pain during pregnancy*. Spine, 2005. **30**(8): p. 983-991.
 14. Laohapand, T., *Thai traditional medicine in the Faculty of Medicine Siriraj Hospital*. 2009, Bangkok: Supavanich Press.
 15. Merskey H, et al., *Classificazione del dolore cronico*. 1996, Città di Castello [Italy]: Il Pensiero Scientifico Editore.
 16. RxList Inc. *Diclofenac for pain and inflammation*. 2013; Available from: <http://www.rxlist.com/voltaren-gel-drug/patient-images-side-effects.htm>.
 17. Dommerholt J, Bron C, and Franssen J, *Myofascial Trigger Points: An Evidence-Informed Review*. Journal of Manual & Manipulative Therapy, 2006. **14**(4): p. 203-221.
 18. Huguenin L and *Myofascial trigger points: the current evidence*. Physical Therapy in Sport., 2004. **5**(1): p. 2-12.
 19. Huguenin L, *Myofascial trigger points: the current evidence*. Physical Therapy in Sport, 2004. **5**(1): p. 2-12.
 20. Dommerholt J and Simons D, *Myofascial Pain Syndrome—Trigger Points*. Journal of Musculoskeletal Pain., 2008. **16**(4): p. 333-338.
 21. Kuan T, *Current studies on myofascial pain syndrome*. Current Pain and Headache Reports, 2009. **13**(5): p. 365-369.
 22. Simons D, Dommerholt J, and *Myofascial Trigger Points and Myofascial Pain Syndrome: A Critical Review of Recent Literature*. Journal of Manual & Manipulative Therapy, 2006. **14**(4): p. 125E-171E.
 23. Margulis., R.K., *Tandem Point(SM) Therapy: An integrated acupuncture approach for myofascial pain*, P.t.R.M.G.R.N.I.o.H. March, Editor. 2000.
 24. J, B.-S. and S. DG, *Focus review myofascial pain*. Archives of Physical Medicine and Rehabilitation 2002. **83**: p. 40-48.

25. J., K., *Referred Pains from Muscle*. . BMJ, 1938. **1**(4023): p. 325-327.
26. Cooper C, Miller J, and *Integrative therapies for fibromyalgia, chronic fatigue syndrome, and myofascial pain*. Rochester. 2010, Healing Arts Press.
27. . Cafarelli, et al., *Vibratory massage and short-term recovery from muscular fatigue and pain*. International Journal of Sports Medicine, 1990. **11**: p. 474-478.
28. Mense, S., *Activity in nociceptive primary afferent fibers and clinical muscle pain*. Pain Forum, 1999. **6**(4): p. 213-216.
29. Buskila D, et al., *The genetics of fibromyalgia syndrome*. Pharmacogenomics, 2007. **8**(1): p. 67-74.
30. International Association for the Study of Pain, *Pain terms: A list with definitions and notes on usage*. Pain 1979. **6**: p. 249-252.
31. McCaffery, M. and *Clinical manual for nursing practice*. Pain 1989.
32. Melzack, P.D. R. and Wall, and *Pain mechanisms: a new theory*. Science, 1965. **150**: p. 971-979.
33. J.J, B. and L. J.D, *History of pain concept and therapies*. Bonica's management of pain, 2001: p. 3-16.
34. Ignatavicius, D.D. and L.M. Workman, *Medical-surgical nursing: Critical Thinking for collaborative care*. 4 ed. 2002, Philadelphia: Saunders.
35. Thai Association for the Study of Pain, *Myofascial pain syndrome Fibromyalgia Guideline*. 2009, Bangkok: Amarin Printing.
36. Wilkie, A.D., *More on a Stochastic Asset Model for Actuarial Use*. British Actuarial Journal 1995. **1**: p. 777-964.
37. Mense, P., *Fibromyalgia syndrome: review of presentation, pathogenesis, outcome measures, and treatment*. The Journal of Rheumatology, 2005. **75**: p. 6-21.
38. McGuire A. , *The mantle beneath the Red Sea margin: xenoliths from western Saudi Arabia*. Tectonophysics, 1988. **150**(1-2): p. 101-119.
39. Joanne Borg-Stein and David G. Simons, *Focused Review Myofascial Pain*. Archives of Physical Medicine and Rehabilitation, 2002. **83**(1): p. 40-47.

40. DG, S., *Muscular Pain Syndromes*. In: Friction JR, Award EA editors. *Myofascial Pain and Fibromyalgia*. 17 ed. Advances in Pain Research and Therapy. 1990, New York: Raven Press.
41. Shah J and G. E, *Uncovering the biochemical milieu of myofascial trigger points using in vivo microdialysis: An application of muscle pain concepts to myofascial pain syndrome*. Journal of Bodywork and Movement Therapies., 2008. **12**(4): p. 371-384.
42. Travell JG and S. DG., *Myofascial Pain and Dysfunction: The trigger point Manual*. Vol. 2. 1983, Baltimore: Williams and Wilkins.
43. Imamura, S.T., A.A. Fisher, and M. Imamura, *Pain management using myofascial approach when other treatment failed*. Physical Medicine and Rehabilitation Clinics of North America 1997. **8**: p. 179 - 196.
44. Bennett R, *Myofascial pain syndromes and their evaluation*. Best Practice & Research Clinical Rheumatology, 2007. **21**(3): p. 427-445.
45. Methatip, A. and P. Yuktanandana, *effects of short-break neck stretching on neck pain and surface EMG median frequency changes in office workers*. EChiang Mai University Journal of Associated Medical Sciences, 2012. **3**(44).
46. Haran R and S. A., *Effect of High Power Pain Threshold Static Ultrasound Combined with Transverse Friction Massage and Stretching on Upper Trapezius Myofascial Trigger Point*. Ind Jour of Physioth and Occupat Therapy 2013. **7**(3): p. 113.
47. มูลนิธิการแพทย์แผนไทยพัฒนา, ศ., ศูนย์พัฒนาตำราการแพทย์แผนไทย มูลนิธิการแพทย์แผนไทยพัฒนา. 2 ed. 2006, นนทบุรี: ศูนย์พัฒนาตำราการแพทย์แผนไทย มูลนิธิการแพทย์แผนไทยพัฒนา.
48. โรงเรียนอายุรเวทธารัง สถานการแพทย์แผนไทยประยุกต์ คณะแพทยศาสตร์ศิริราชพยาบาล มหาวิทยาลัยมหิดล, การแพทย์แผนไทยในคณะแพทยศาสตร์ศิริราชพยาบาล. 2009, สุภาวนิชการพิมพ์: กรุงเทพฯ.
49. Buttagat V, et al., *The immediate effects of traditional Thai massage on heart rate variability and stress-related parameters in patients with back pain associated with myofascial trigger points*. Journal of Bodywork and Movement Therapies, 2011. **15**(1): p. 15-23.

50. Chatchawan U, et al., *Effectiveness of traditional Thai massage versus Swedish massage among patients with back pain associated with myofascial trigger points*. Journal of Bodywork and Movement Therapies, 2005. **9**(4): p. 298-309.
51. R., C., *Evidence-based medicine: Toward a new definition of “ Rational Medicine”*. Health 2003. **28**: p. 305-317.
52. Melzack, R., D.M. Stillwell, and E.J. Fox, *Trigger points and acupuncture points for pain correlations and implications*. Pain, 1977. **3**: p. 3 - 23.
53. Goddard G1, et al., *Acupuncture and sham acupuncture reduce muscle pain in myofascial pain patients*. Journal of Orofacial Pain, 2002. **16**(1): p. 71-76.
54. Tough EA1, et al., *Effectiveness of acupuncture/dry needling for myofascial trigger point pain*. Physical Therapy Reviews, 2011. **16**(2): p. 147-154.
55. Moral O, *Dry Needling Treatments for Myofascial Trigger Points*. Journal of Musculoskeletal Pain, 2010. **18**(4): p. 411-416.
56. Hsieh YL1, et al., *Dry needling to a key myofascial trigger point may reduce the irritability of satellite MTrPs*. American Journal of Physical Medicine & Rehabilitation, 2007. **86**(5): p. 397-403.
57. Kalichman L and Vulfsons S, *Dry Needling in the Management of Musculoskeletal Pain*. Journal of the American Board of Family Medicine, 2010. **23**: p. 640 – 646.
58. Ilbuldu E, et al., *Comparison of Laser, Dry Needling, and Placebo Laser Treatments in Myofascial Pain Syndrome*. Photomedicine and Laser Surgery, 2004. **22**(4): p. 306-311.
59. Dalmau-Carola J, *Myofascial Pain Syndrome Affecting the Piriformis and the Obturator Internus Muscle*. Pain Practice, 2005. **5**(4): p. 361-363.
60. Saime Ay, Deniz Evcik, and Birkan Sonel Tur, *Comparison of injection methods in myofascial pain syndrome: a randomized controlled trial*. Clinical Rheumatology, 2010. **29**(1): p. 19-23.
61. Soares A, et al., *Botulinum toxin for myofascial pain syndromes in adults*. 2012, The Cochrane Collaboration: Published by John Wiley & Sons.

62. Siamhealth.net. *Nonsteroidal anti-inflammatory drug*. 2013; Available from: http://www.siamhealth.net/public_html/Disease/rheumatoid/gout/nsaid.htm#.VSoRs_mUcpl.
63. Argoff C and *A review of the use of topical analgesics for myofascial pain*. Current Pain and Headache Reports, 2002. **6**(5): p. 375-378.
64. Argoff C and *Topical treatments for pain*. Current Pain and Headache Reports, 2004. **8**(4): p. 261-267.
65. Drugs.com. *Diclofenac topical* 2013; Available from: <http://www.drugs.com/>.
66. The Department for the Development of Thai Traditional and Alternative Medicine of Public Health care, *Guidelines Health care of Thai Traditional Medicine*. 2004, The War Veterans Organization of Thailand Under Royal Patronage of his Majesty the king: Bangkok.
67. Tanmakuln, P. P. and Silitertpisan, and *Comparison of the treatment effects of deep-friction massage and self-stretching on the trigger points of the upper trapezius muscle*. Journal of Preventive Medicine Association of Thailand 2012. **2**: p. 2.
68. Foundation for the Promotion of Thai Traditional Medicine, A.-V.C., *Thai traditional therapeutic massage and manipulation (court-type massage)*. 2012, Bangkok: Usa Printing.
69. โรงเรียนอายุรเวทธำรง สถานการแพทย์แผนไทยประยุกต์ คณะแพทยศาสตร์ศิริราชพยาบาล มหาวิทยาลัยมหิดล, *หัตถเวชกรรมแผนไทย(การนวดแบบราชสำนัก) การนวดจุดสัญญาณ*. 2014, กรุงเทพฯ: ศุภานิชการพิมพ์.
70. School., A.T., *Thai Traditional Medicine in the Faculty of Medicine Siriraj Hospital*. . 2009, Bangkok: Supavanich Press.
71. มูลนิธิการแพทย์แผนไทยพัฒนา, ศ., *คู่มืออบรมการนวดไทยแบบราชสำนัก*. 2006, นนทบุรี: ศูนย์พัฒนาตำราการแพทย์แผนไทย มูลนิธิการแพทย์แผนไทยพัฒนา.
72. Carvalho G, et al., *Comparison between neck pain disability and cervical range of motion in patients with episodic and chronic migraine: A cross-sectional study*. Journal of Manipulative and Physiological Therapeutics, 2014. **37**(9): p. 641-646.

73. Park G, et al., *Reliability and usefulness of the pressure pain threshold measurement in patients with myofascial pain*. Annals of Rehabilitation Medicine, 2011. **35**(3): p. 412.
74. Ay S, Evcik D, and T. B, *Comparison of injection methods in myofascial pain syndrome: a randomized controlled trial*. Clin Rheumatol, 2009. **29**(1): p. 19-23.
75. Majlesi J and Ünalın H, *High-power pain threshold ultrasound technique in the treatment of active myofascial trigger points: a randomized, double-blind, case-control study*. Archives of Physical Medicine and Rehabilitation, 2004. **85**(5): p. 833-836.
76. Hsieh L, et al., *Efficacy and side effects of diclofenac patch in treatment of patients with myofascial pain syndrome of the upper trapezius*. Journal of Pain and Symptom Management, 2010. **39**(1): p. 116-125.
77. Ge H, et al., *Contribution of the local and referred pain from active myofascial trigger points in fibromyalgia syndrome*. Pain, 2009. **147**(1): p. 233-240.
78. Fryer G, Hodgson L, and *The effect of manual pressure release on myofascial trigger points in the upper trapezius muscle*. Journal of Bodywork and Movement Therapies, 2005. **9**(4): p. 248-255.
79. Kao M, et al., *Myofascial Trigger Points in Early Life*. Archives of Physical Medicine and Rehabilitation., 2007. **88**(2): p. 251-254.
80. Laursen B, et al., *Health related quality of life and quantitative pain measurement in females with chronic non-malignant pain*. European Journal of Pain, 2005. **9**(3): p. 267-267.
81. Hernández-Díaz, C.V.L. S., and L.G. Rodriguez, *Nonsteroidal antiinflammatory drugs the risk of acute myocardial infarction*. Basic clinical Pharmacol, 2006. **98**: p. 266-274.
82. G, M., *Topical Analgesics*. Perioperative Nursing Clinics, 2009. **4**(4): p. 391-403.
83. Duan W, Lu J, and X. Y., *Mechanisms of Topical Analgesics in Relieving Pain in an Animal Model of Muscular Inflammation*. Pain Med, 2013. **14**(9): p. 1381-1387.

84. S., S., *Topical Agents for the Management of Musculoskeletal Pain*. Journal of Pain and Symptom Management, 2007. **33**(33): p. 342-355.
85. Junwibool P and Fakkham S. *Effectiveness of Thai Royal massage in Myofascial Pain Syndrome ,s Patients in Professional Experience Center Applied Thai Medicine*. . 2015; Available from: <http://www.ssruii.ssru.ac.th/bitstream/ssruir/296/1/019-53.pdf>.
86. Jampangern J, *Studies on health –related quality of life in patients with Musculoskeletal Disorders who were treated with Thai Massager at Tayang Hospital Phetchaburi 2550*, Silpakorn University.
87. Kummerddee K, *Effectiveness comparison between Thai traditional massage and chinese acupuncture for myofascial back pain in Thai military personnel: A Preliminary Report*. Journal of the Medical Association of Thailand, 2009. **92**(1).
88. Leelayuwat N, et al., *Effectiveness philosophy of Thai massage reduce pain of muscle and complication*. Thai Traditional and Alternative Medicine., 2012.
89. Sitikaipong k, et al., *Comparative Study the Efficacy of Thai Massage and Analgesic Drug (Diclofenac) to Relief Shoulder Pain*. Journal of Health Science, 2014. **23**: p. 842-9.



APPENDIX

จุฬาลงกรณ์มหาวิทยาลัย
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VITA

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