การใช้ลูกประคบสมุนไพรไทยสำหรับบรรเทาอาการเจ็บปวดของโรคข้อเข่าเสื่อมระยะเริ่มต้นในผู้สูงอายุ

USING THAI HERBAL COMPRESSES FOR PAIN RELIEF AMONG THE ELDERLY WITH EARLY-STAGE OSTEOARTHRITIS ON KNEES

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บทคัดย่อ

โรคข้อเข่าเสื่อม (Osteoarthritis - OA) เป็นภาวะที่พบได้บ่อยที่สุดของข้อต่อซึ่งทำให้เกิดความยากลำบากในการทำกิจวัตรประจำวันของผู้สูงอายุ ในงานวิจัยนี้มีวัตถุประสงค์เพื่อศึกษาผลการตอบสนองทางคลินิกต่อการรักษาโรคข้อเข่าเสื่อมด้วยลูกประคบสมุนไพร การวิจัยครั้งนี้เป็นการวิจัยกึ่งทดลอง อาสาสมัครคือผู้สูงอายุที่มีภาวะโรคข้อเข่าเสื่อมในระยะเริ่มแรก จำนวน 30 คน อาสาสมัครได้รับการรักษาอาการปวดข้อเข่าโดยการประคบร้อนด้วยลูกประคบสมุนไพรเป็นเวลา 30 นาทีต่อครั้ง (2 ครั้งต่อสัปดาห์ เป็นเวลา 4 สัปดาห์) อาสาสมัครประเมินความปวดด้วยมาตรวัดความปวดแบบตัวเลขก่อนและหลังการรักษาทันที หลังจากได้รับการรักษาอาการข้อเข่าเสื่อมเป็นเวลา 4 สัปดาห์ พบว่าการประคบร้อนด้วยลูกประคบสมุนไพรช่วยลดอาการเจ็บปวดจากโรคข้อเข่าเสื่อมได้ โดยมีความแตกต่างอย่างมีนัยสำคัญทางสถิติของความเจ็บปวดก่อนและหลังการรักษา ($p < 0.01$)

คำสำคัญ: ผู้สูงอายุ โรคข้อเข่าเสื่อม การดูแลสุขภาพทางเลือก ลูกประคบสมุนไพรไทย

Abstract

Osteoarthritis (OA) is the most common chronic condition of the joints that leads to reduction in the daily activities of the elderly. The purpose of this quasi-experimental research was to investigate the clinical responses to treating osteoarthritis of the knee among the elderly with Thai herbal compresses. Thirty elderly patients with this condition participated in a program in which they received 30-minute sessions of hot Thai herbal compress treatment, twice a week for 4 weeks. The participants scored a pain level, before the treatment, and again after the treatment. Based on the participant's pain level scores, the result was that the hot Thai herbal compress treatment reduced the pain of osteoarthritis of the knees, with the level of reduction in pain being statistically significantly different ($p < 0.01$).

Keywords: elderly, osteoarthritis of knee, alternative health care, Thai herbal compress

Introduction

Osteoarthritis (OA) is the most common form of arthritis that affects the joint cartilage and the adjoining bone tissue, resulting in physical and functional failure of the synovial joints (Chiranthanut et al., 2014). Normally, the joints are constantly undergoing repair of damage caused by normal wear and tear from usual daily activities. However, particularly in the elderly, this repair process ceases to be effective and OA develops as a result. Early-stage OA of the knee can be evaluated by using the Oxford knee score functional questionnaire (Dawson et al., 1998; Edmondson et al., 2011; Jenny & Diesinger, 2012).

Many factors play a role in the development of OA, including increasing age. At least 50% people aged over 65 have OA in one or more joints (Yegane et al., 2011; Loew et al., 2012). Genetics is another factor, with the propensity for developing OA possibly being inherited. Gender also plays a role, with women being more vulnerable than men, and having a previous injury to the joint, or joint damage caused by the increased load on the joints by obesity, are also factors.

The knee is the joint that is most frequently affected by OA (Nuki, 1999), and is a significant public health problem. In Thailand, for example, the United Nations projection has reported that Thailand is now an Aged Society, with 10.5% of the population aged over 65 in 2015 to 13% in 2020, 19.5% in 2030, and 25.9% in 2040 (Wongboonsin and Phiromswad, 2015). Knodel et al. (2015) found that at least 80% of people aged 70 or over had early-stage osteoarthritis. The most commonly used treatment for OA is conventional medicine and physical therapy, separately or in combination. The pharmacological approach to the symptomatic treatment of OA is pain relief medication or anti-inflammatories, which, however, often have adverse effects (Soltanian et al., 2009; Argoff, 2013; Stanos, 2007). Surgical intervention is possible, but has a high economic costs (Kim, 2006).

Alternative health care options are seen as being at least as effective as these conventional treatments, but are less toxic. Alternative health care is a group of diverse healthcare systems associated with five major domains: (1) Mind and body interventions: These interventions are designed to use the ability of the mind to affect the functioning of the body. These include yoga, meditation, acupuncture, art therapy, and dance therapy, among others, (2) Biologically based treatments: The use of natural products such as herbs, minerals and vitamins, (3) Manipulative and body-based treatments: These treatments use movement and manipulation of various parts of the body, (4) Energy therapies: These treatments involve the manipulation of energy fields, (5) Alternative systemic therapies: These treatments are complete systems based on an explanation of the disease, the diagnosis, and the therapy. These various alternative

and traditional health-oriented systems include Ayurveda, Homeopathy, Naturopathy and Chinese or Oriental medicine (Tabish, 2008). Thai traditional medicine, also, is a traditional healing system based on ancient remedies, which combines acupressure, Indian Ayurvedic principles, assisted yoga postures and traditional healing art based on Buddhist philosophy (Kogiso, 2012).

Thai traditional massage was based on local knowledge of Thai traditional medicine, and ancient wisdom in its application. Thai traditional massage uses deep compression, rhythmic pressing and stretching intended to relax muscles and tendons, manipulating the range of joint motion and regional blood circulation, and decreased forearm fatigue (Yoopat et al., 2015). The use of Thai herbal compresses, in conjunction with Thai traditional massage, as special practices for alleviating pain syndromes, had been used in Thailand for hundreds of years (Jacobsen & Salguero, 2014). In previous studies, Thai herbal compresses have been studied in a variety of clinical conditions, and have been shown to relieve the symptoms of insufficient or delayed lactation (Listisit & Pakdeechot, 2009), labor pains (Iampornchai et al., 2009), myofascial pain (Puengsuwan et al., 2009), musculoskeletal disorders, including knee pain (Sukonthasarn, 2004) and OA of the knee (Chiranthanut et al., 2014). Thai traditional massage and Thai herbal compresses have been reported as being helpful in complementary therapy for painful syndromes, in numerous studies (Picheansoonthon et al., 2008; Shinnawattananonda, 2004; Subcharoen & Pechprai, 1995).

There has, however, been little scientific research into the use of Thai herbal compress for the pain relief of OA of the knee, to confirm the efficacy of this treatment, or otherwise. This was the purpose of the present study, with a focus on pain relief treatment for the elderly with early-stage osteoarthritis of the knee.

Methods and Materials

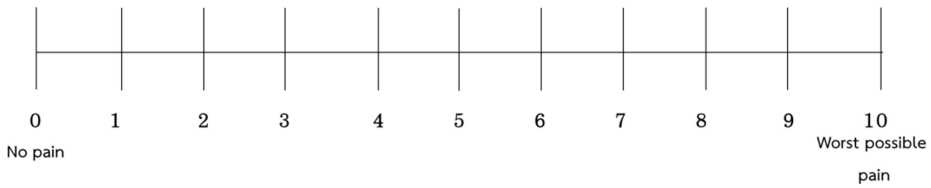
A total of 30 participants were invited to participate. A convenience sampling method was used. The inclusion criteria were: (i) early-stage patients for osteoarthritis (Oxford knee score functional questionnaire); (ii) aged over 60; (iii) manifested no signs of mental disorders, or inability to communicate, no movement disability, and no signs of metabolic syndrome. All participants were fully informed, and provided an indication of informed consent prior to their participation in the study.

Thai herbal compresses were prepared by the Department of Health Education and Health Promotion, Faculty of Science and Technology, Pibulsongkram Rajabhat University. Each herbal compress ball was composed by dried herbs including cassumunar ginger (500 g), turmeric (100 g), lemongrass (100 g), bergamot (200 g),

tamarind leaves (300 g), citrus fruit leaves (100 g), salt (1 tablespoon), camphor (2 tablespoons) as shown in Figure 1.

Figure 1 Thai herbal compress ball

Thirty elderly patients with this condition participated in a program in which they received 30-minute sessions of hot Thai herbal compress treatment, twice a week for 4 weeks. The treatment included the application of the hot compresses, together with kneading of the knee, each time from the same professional practitioner. The pain score of the knee was measured according to a numerical rating scale (Achananuparp & Thermsirikunchai, 2009), before and after each treatment session. The pain level classifications, shown in Figure 2, were used to analyze the clinical responses of the participants. The pain level responses of the participants were evaluated statistically by the mean ($\overline{x}$), standard deviation (S.D.) and a paired t-test.



Rating score	Description
0	No pain, move without the pain
1 - 3	Mild pain, move with the slight pain
4 - 6	Moderate pain, move with the pain
7 - 10	Worst possible pain

Figure 2 The rating of classification of pain levels

The study was conducted over a period of four weeks. The time schedule and detailed procedures of the research activity are shown in Figure 3.

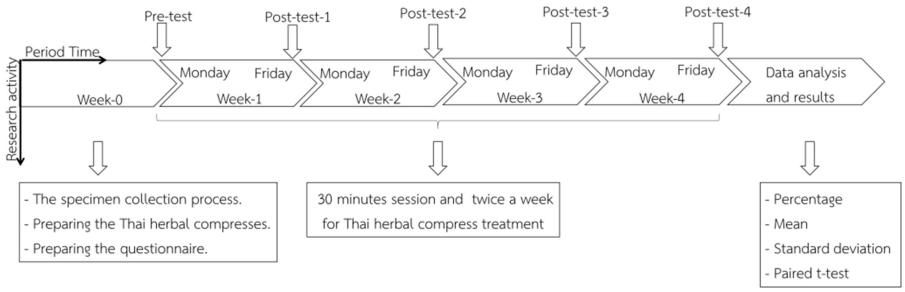


Figure 3 Schedule of the research activity

For each 30-minute treatment, the Thai herbal compress was soaked in water for about a minute. It was then warmed in a steamer, for 10 to 15 minutes, to a temperature of 40°C to 45°C, ensuring that the temperature was not damaging to the skin. The herbal compress was then wrapped in a towel to shield the skin from injury, and applied to the knee area. The treated areas were touched with gentle pressure with a rolling, dragging, or pressing motion. The herbal compress and physical manipulation was applied at each point for about 10 seconds. During the 30-minute treatment, the herbal ball would be replaced when it had cooled to lukewarm. The same herbal ball was reused for three treatments, then discarded.

Results

The demographics of the participants are shown in Table 1 (gender) and Table 2 (age). During the first week, the participants completed the pre-test pain questionnaire. Table 3 contains the results of pre-test and post-test classification of pain levels test based on numerical rating scale (NRS). In the first week, the pre-test results show that the mean value ($\overline{x}$) was equal to 8.03 of 10, which the score definition was worst possible pain, and cannot operate regular activities. After treatment, they were feeling better before treatment which shown by pain levels results, 6.50 of 10 was the mean value ($\overline{x}$). The pain level was decreased from pre-test to post-test (mean difference 1.53, 95% CI 1.25-1.81). For 2nd-4th - week, the post-test results show that the mean value of the rating of classification of pain levels was decreased. These were 5.00 (mean difference 3.03, 95% CI 2.75-3.31), 3.63 (mean difference 4.40, 95% CI 4.14-4.66) and 2.07 (mean difference 5.96, 95% 5.70-6.23) for 2nd-week, 3rd-week and 4th-week, respectively. Moreover, a paired-samples t-test was conducted to compare the pain levels before and after treatment program. The pain levels were decreased significantly ($p < 0.01$).

Table 1 Participants classified by gender

Gender	Number (n)	Percentiles
Man	10	33.3
Woman	20	66.7
Total	**30**	**100.0**

Table 2 Participants classified by age

Age	n	Percentiles
60	7	23.3
63	2	6.7
65	3	10
66	1	3.3
67	3	10
68	1	3.3
69	2	6.7
70	4	13.3
72	1	3.3
74	1	3.3
75	2	6.7
76	2	6.7
85	1	3.3
Total	**30**	**100**

Table 3 The responses results of pain levels before and after treatment program

Test	n	$\overline{x}$	S.D.	t	*p*-value	Mean difference (95% CI)
Pre-test	30	8.03	0.76			
Post-test 1st-week	30	6.50	0.68	14.69*	0.00	1.53 (1.25-1.81)
Pre-test	30	8.03	0.76			
Post-test 2nd-week	30	5.00	0.69	21.72*	0.00	3.03 (2.75-3.31)
Pre-test	30	8.03	0.76			
Post-test 3rd-week	30	3.63	0.61	26.94*	0.00	4.40 (4.14-4.66)
Pre-test	30	8.03	0.76			
Post-test 4th-week	30	2.07	0.64	32.70*	0.00	5.96 (5.70-6.23)

Remark * $p < 0.01$ and CI is confidence interval.

Discussion

After applying a traditional Thai remedy in the form of a Thai herbal compress, the participants reported that the treatment of their condition of early-osteoarthritis of the knee was successful in easing their symptoms. We speculate that the mechanism

of muscles pain can be defined by gate control theory which describes a process of inhibitory pain modulation at the spinal cord level. By activating nerve fibers with tactile pressure, the non-noxious stimuli inhibitory interneurons in the dorsal horn are activated, leading to the inhibition of pain signals transmitted via C fibres. The transcutaneous electrical nerve stimulation (TENS or TNS) is based on the gate control theory. Stimulation of the large diameter afferent nerve fibres, by cutaneous electrodes, activates inhibitory processes in the dorsal horn and inhibits pain transmission by the C fibres. The counter-stimulation measures such as heat, massage and acupuncture are methods that can close the pain pathways mechanism (Melzack & Wall, 1965; Britton & Skevington, 1989 Melzack, 1996; Mendell, 2014). Thus, the success of the knee treatment that included warm compresses (40°C to 45°C) and gentle touching pressure (rolling, dragging, and pressing) in reducing the knee pain. Based on traditional recipes, the herbal compress was prepared with various herbs that have always been considered to have medicinal and pain relief properties. Cassumunar ginger has been used for reduce pain and swelling especially in musculoskeletal pain (Chongmelaxme et al., 2017) and turmeric has been used to diminish inflammation (Jurenka et al., 2009). In addition, a dry Thai herbal compress has been shown to decrease pain and lower daily drug usage against osteophytes in the elderly (Maganud, 2008). Another study of patients with osteoarthritis of the knee, conducted with patients from a prominent Thai hospital found that the mean pain scores decreased during the first two days of the hot herbal compress treatment which rapid than herbal compress and isometric knee exercise group (Lekutai et al, 2008).

A few limitations regarding this study should be mentioned. As the number of participants is relatively small (n = 30), future studies should incorporate a larger sample size that adequately provides for between-group changes in the longer term effects of using the herbal compresses for pain relief among the elderly with early-stage OA. Another limitation due to time constraints is that the course of treatment was limited to 4 weeks. This could not demonstrate whether or not maximal efficacy was achieved by the end of the 4-week period. Therefore, further studies with a longer study period should be undertaken. Additionally, further studies are required to be conducted to evaluate the economic value of Thai herbal compresses for relieving the pain of osteoarthritis of the knees.

Conclusion

The clinical responses to the symptomatic treatment of OA of the knee by applying Thai herbal compresses were studied. The responses of the 30 elderly patients with early-stage osteoarthritis of the knees who were given a 4-week program

of treatment, using Thai herbal compresses, together with gentle physical therapy, were obtained by an Oxford Knee Score functional questionnaire. Analysis of these responses showed that the pain levels being experienced by the participants decreased significantly. This experimental program allows us to confidently recommend this treatment as an effective alternative option for treatment of OA on knees.

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References

Achananuparp L, Thermsirikunchai R. Pain assessment and behavior responded to pain of postoperative patients in recovery room, *Ramathibodi Nursing Journal*. 2009; 15(3): 315-326.

Argoff CE. Topical analgesics in the management of acute and chronic pain. *Mayo Clinic Proceedings*: Elsevier, 2013.

Britton NF, Skevington SM. A mathematical model of the gate control theory of pain, *Journal of Theoretical Biology*. 1989; 137: 91-105.

Chiranthanut N, Hanprasertpong N, Teekachunhatean S. Thai Massage, and Thai herbal compress versus oral ibuprofen in symptomatic treatment of osteoarthritis of the knee: A randomized controlled trial, *BioMed Research International*. 2014; 2014: 1-13.

Chongmelaxme B, Sruamsiri R, Dilokthornsakul P. et al. Clinical effects of Zingiber cassumunar (Plai): A systematic review, *Complementary Therapies in Medicine*. 2017; 35: 70-77.

Dawson J, Fitzpatrick R, Murray D. et al. Questionnaire on the perceptions of patients about total knee replacement, *The Journal of Bone and Joint Surgery*. 1998; 80(1): 63-69.

Edmondson MC, Isaac D, Wijeratna M. et al. Oxford unicompartmental knee arthroplasty: medial pain and functional outcome in the medium term, *Journal of Orthopaedic Surgery and Research*. 2011: doi:10.1186/1749-799X-6-52.

Iampornchai S, Poopong S, Nongbuadee S. et al. Court-type traditional Thai massage and hot herbal compress: effectiveness in relieving early postpartum backache, *Journal of Thai Traditional & Alternative Medicine*. 2009; 7: 181-188.

Jacobsen N, Salguero CP. *Thai Herbal Medicine: Traditional Recipes for Health and Harmony*. Findhorn Press; 2014.

Jenny JY, Diesinger Y. The Oxford Knee Score: Compared performance before and after knee replacement, *Orthopaedics & Traumatology: Surgery & Research*. 2012; 97(4): 409-412.

Jurenka J. Anti-inflammatory Properties of Curcumin, a Major Constituent of Curcuma longa: A Review of Preclinical and Clinical Research, *Alternative Medicine Review*. 2009; 14(2): 141-153.

Kim HC. Nonsurgical treatment of osteoarthritis, *Journal of the Korean Medical Association*. 2006; 49 (5): 457-463.

Knodel J, Teerawichitchainan B, Prachuabmoh V. et al. *Thailand's Older Population: An update based on the 2014 Survey of Older Persons in Thailand. Population Studies Center Research Report 15-847*. University of Michigan; 2015.

Kogiso K. Thai massage and health tourism in Thailand: tourism acculturation process of "Thai Massage", *International Journal of Sport and Health Science*. 2012; 10: 65-70.

Lekutai S, Tansuwannon W, Sereechotchahiran S. et al. Pain-relieving effects of hot herbal compress in patients with knee osteoarthritis, *Journal of Thai Traditional & Alternative Medicine*. 2008; 6(2): 219-228.

Listisit P, Pakdeechot S. The effect of increasing milk production program in mothers with cesarean section, Sakon Nakhon Hospital, *Journal of Sakon Nakhon Hospital*. 2009; 12(3): 25-34.

Loew L, Brosseau L, Wells GA. et al. Ottawa panel evidence-based clinical practice guidelines for aerobic walking programs in the management of osteoarthritis, *Archives of Physical Medicine and Rehabilitation*. 2012; 93: 1269-1285.

Maganud R. *Effect of dry-preserved herbs on knee joint pain among the elderly with knee osteoarthritis.* Master of Nursing Science (Community Health Nurse Practitioner), Graduate School, Naresuan University, 2008.

Melzack R, Wall D. Pain mechanism: a new theory. *Science*. 1965; 150(3699): 971-979.

Melzack R. Gate control theory: On the evolution of pain concepts, *Pain Forum*. 1996; 5(2): 128-138.

Mendell LM. Constructing and deconstructing the gate theory of pain, *PAIN*. 2014; 155(2): 210-216.

Nuki G. Osteoarthritis: a problem of joint failure, *Zeitschrift Fur Rheumatologie journal*. 1999; 58:142-147.

Picheansoonthon C, Wiwek T, Phonrat B. et al. Clinical study of Chanta-lee-la herbal household remedy, *Journal of Thai Traditional & Alternative Medicine*. 2008; 6: 212-218.

Puengsuwan P, Kamolrat T, Siritaratiwat W. et al. A comparative study of heat effect between hot pack and Thai herbal ball on pain and physiological changes, *Journal of Medical Technology and Physical Therapy*. 2009; 21: 74-82.

Shinnawattananonda P. The directions of integrating Thai traditional medicine, folk medicine, and alternative medicine into healthcare system. *Wibulpolprasert S, Petrakas P. (Eds.). Thai Health: Thai Wisdom*. U-sa Printing. Bangkok; 2004: 101-157.

Soltanian A, Faghihzadeh S, Mehdibarzi D. et al. Assessment of marhame-mafasel pomade effect on knee osteoarthritis with non-compliance, *Journal of Research in Health Sciences*. 2009; 9(2): 19-24.

Stanos SP. Topical agents for the management of musculoskeletal pain, *Journal of Pain and Symptom Management*. 2007; 33(3): 342-355.

Subcharoen P, Pechprai D. Present status of traditional medicine in Thailand. *In: International Seminar on Traditional Medicine.* Queen Sirikit National Convention Center. Bangkok Thailand; 1995: 10-13.

Sukonthasarn P. The effectiveness of hot herbal compression and knee exercise on knee joint pain reduction among the elderly, *Thai Health Promotion Journal*. 2004; 1(1): 23-35.

Tabish SA. Complementary and Alternative Healthcare: Is it Evidence-based?, *International Journal of Health Sciences*. 2008; 2(1): 5-9.

Wongboonsin K, Phiromswad P. Super-aged society a broadly neglected national agenda. *Bangkok Post*, September 25, 2015. https://www.bangkokpost.com/print/667928/. Accessed February 6, 2018.

Yegane A, Mottaghi A, Moghimi J. Correlation of quantified MRI, physical exam and knee radiography in patients with knee osteoarthritis, *Tehran University Medical Journal*. 2011; 9(3): 185-200.

Yoopat P, Maes C, Poriau S. et al. Thai traditional massage: Efficiency-assessment of three traditional massage methods on office workers: An explorative study, *Journal of Bodywork and Movement Therapies.* 2015; 19(2): 246-252.