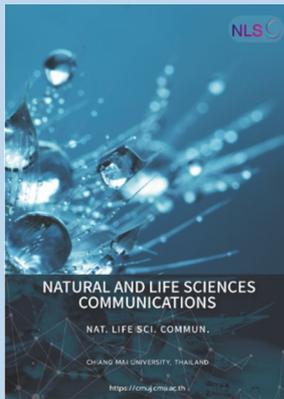


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The Effects of Tok Sen Massage Menu for Relaxation on Muscle Flexibility and Relaxation among User of the Lanna Spa Service for Health Tourism

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ABSTRACT

In spas in northern Thailand, Tok Sen massage is one aspect of the wisdom of health care in northern communities; it stimulates better functioning of blood circulation, the lymphatic system, and the nervous system, while helping to relieve pain, stiffness, and fatigue in various body parts, due to muscle flexibility and relaxation. This study aimed to examine the effects of Tok Sen massage for relaxation on muscle flexibility and relaxation. A randomized controlled trial enrolled 80 persons who met the inclusion criteria and were willing to participate in the Lanna Spa Service for Health Tourism between January and March 2022. They were randomly assigned to an experimental group (n=40) who received the Tok Sen massage for relaxation, and a control group (n=40) who were instructed to lie down in a comfortable environment without receiving a massage. Data were collected using a demographic form, a muscle flexibility record form, a relaxation assessment form, an automatic blood pressure and pulse monitor, a ruler, and the sit-and-reach tester. Demographic data were analyzed using descriptive statistics. Differences between groups were compared using Fisher's exact test, independent t-test, and the Mann-Whitney U test. The results showed that there was a statistically significant difference between the experimental group and the control group in the flexibility of the lower back muscles, hamstring muscles, hip muscles, shoulders, scapula, chest, and arm muscles ($P < .01$), and in relaxation ($P < .001$). The findings support the effectiveness of the Tok Sen massage menu on promoting muscle flexibility and relaxation.

Keywords: Tok Sen massage, Muscle flexibility, Relaxation



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INTRODUCTION

In modern society, people tend to care more about their health and safety [Khamanarong et al., 2009]. This contributes to the increased popularity of health tourism in many countries, with an estimated value expansion of as high as \$639.4 billion [The Global Wellness Institute, 2018]. Health tourism is defined as people preferring to travel to different countries to improve their quality of life and their physical or mental health, and it covers both medical and wellness tourism. One component of health tourism which constitutes a specific market segment is spa and wellness tourism which includes travel for sauna, massage, and other health activities [Romanova, et al., 2015]. Health spas are one of the most popular tourism activities [Unthong et al., 2015], and they provide holistic health treatment that covers physical and mental health, allowing customers to be satisfied with experiences gained from spa services such as massage for health, hydrotherapy, relaxation, energy-balancing sessions, aesthetics, art and music [Klunklin et al., 2021].

Thailand is famous for its hospitality businesses, and especially for health spa businesses [Khamanarong et al., 2009]. According to a study by the World Tourism Organization (WTO), Thailand is considered a diversified tourism market that has a uniqueness in Thainess [Chan-iad et al., 2018]. The northern region is considered the image of Thai tourism and also has the potential to accommodate tourists. Chiang Mai province is an important tourist destination and is the capital of Lanna culture which is more than 700 years old [Apivantanaporn and Walsh, 2012]. Health spa businesses have applied services that incorporate a unique Lanna identity, covering distinctive shapes, tastes, smells, sounds and touches to provide services in health spa establishments [Awirothananon et al., 2016]. In addition, the direction of the 12th National Economic and Social Development Plan (2017-2021) of the National Economic and Social Development Council (NESDC) focuses on the development of Thailand from a middle income to high income country with stability and sustainability. One important strategy is the development of tourism products and services, especially in the area of health tourism. In addition, the government's policy has determined the development of Thailand as a global medical hub. Thus, health spas are one of the businesses whose importance is stressed by the government in the development of health establishment standards.

According to the literature review, there are many types of relaxation techniques such as autogenic relaxation, progressive muscle relaxation, and visualization [Vambheim, et al., 2021]. Autogenic refers to something that comes from people themselves. This relaxation technique uses both visual imagery and body awareness. People may imagine a peaceful setting, and then focus on relaxing their breathing, slowing the heart rate, or feeling different physical sensations, such as relaxing each arm or leg, one by one, which may help one relax and reduce muscle tension. The progressive muscle relaxation technique focuses on slowly tensing and then relaxing each muscle group by focusing on the difference between muscle tension and relaxation. One method of progressive muscle relaxation starts by tensing and relaxing the toe muscles and progressively working up to the neck and head (it can also start with the head and neck, and work down to the toes). Muscles are tensed for about five seconds, then relaxed for 30 seconds, and repeated. This technique is best done in a quiet area without interruptions. For visualization, people may form mental images to take a visual journey to a peaceful, calming place or situation, trying to include as many of the senses, such as smell, sight, sound, and touch. If one imagines relaxing at the ocean, for instance, they should think about the smell of salt water, the sound of crashing waves and the warmth of the sun on the body, and focus on their breathing, aiming to focus on the present and think positive thoughts. Moreover, other relaxation techniques may include breathing exercise, meditation, yoga, Tai chi, aromatherapy, hydrotherapy, and massage (Lindquist et al., 2023).

Massage is used to relieve aches and pains, and is more accepted nowadays as an approach to health promotion which stimulates blood circulation, promoting the function of the lymphatic and nervous systems, thereby increasing clients' relaxation, as massage helps muscles relax, and relieving pain, tension, and fatigue in various parts of the body [Harris, 2023]. However, treatment with massage therapy alone takes a long time and massage by fingers is not powerful enough. Therefore, Tok Sen or hammer massage is used to give more massage power within a shorter period.

Tok Sen massage for relaxation is one of the choices in spa services which often include a variety of options for relaxation such as Thai traditional massage, Thai herbal ball hot massage, Royal Thai Lanna massage, aromatherapy oil massage, foot spa therapy, and Lanna holy water hydrotherapy. The Tok Sen massage method is an aspect of local wisdom used to maintain health in northern communities and passed down through generations. It is unique in the Lanna folk medicine system developed from the act of wiping, blowing, and pulling apart to relieve aches and pains, and treat problems with muscles, tendons, and joints [Lanna Medicine and Public Health Studies, 2021].

Tok Sen massage involves using a mallet and a wooden wedge to hammer the skin muscle areas that are stiff (called stiff tendons by local people). The clashing wood generates sound waves and vibrations. By hammering the wedges placed on the skin over the stiff muscles, sound waves and vibrations are transmitted through the wedge deeper into the skin than by pressing fingers. Sometimes clients feel a wave or electric current passing through the peripheral nerves or the tip of the foot as soon as the wooden wedge is hammered [Lamonprom, date unknown]. Tok Sen massage seems to employ a similar principle to that of the activator method treatment, which is a technique used by chiropractors to treat patients. A small activator adjusting instrument is pressed into the muscles of the patient with pain stimulated by high-speed tools. As a result, pain in the back, neck and other areas is reduced [Huggins et al., 2012]. This instrument gives low amplitude (high velocity, low amplitude trust) down to the area of pain with stimulation by pressing (high speed), making the muscles unable to respond to the stimulus that occurs. Therefore, the muscles become relaxed without any resistance, resulting in effective treatment [Minx, 2020]. Similarly, Tok Sen massage relies on the speed of hammering into the pain area and muscle tension in the body, causing the muscles to relax and the tendons to become flexible. Muscle flexibility can be measured using the sit-and-reach test to assess the flexibility of the lower back muscles, hamstring muscles, and hip muscles, as well as the back-scratch test to assess the stretching of the muscles in the shoulders, shoulder blades, chest, and arms to measure the flexibility of the lower back. Moreover, massage outcomes can be assessed from the feeling of relaxation after the massage by surveying clients after they have received Tok Sen massage.

Tok Sen massage has many positive effects for service recipients. However, there may be adverse reactions including pain, swelling, redness, muscle spasm, and bruising, if the massage therapist does not have sufficient expertise. At present, there have been no reports of deaths, but using the wrong technique or method, or using too much force, can cause bone fractures, bleeding, or paralysis. Therefore, all therapists need to be trained and qualified to provide service in order to prevent serious adverse reactions (Tririsilp, 2008).

At present, the methods of massage therapy for people receiving spa services vary according to the spa menu of each establishment. According to the literature review, Tok Sen massage has never been tested or scientifically validated to determine the effects or adverse outcomes on clients. Therefore, this first-time study to obtain a standard quality massage menu which is suitable for the public. The purpose of this research was to examine the effect of Tok Sen massage for relaxation on muscle flexibility and relaxation among general people who received the Lanna spa service for health tourism. The findings will help raise the standard of service quality and ensure quality and service standards for both

service providers and service recipients to increase competitiveness both domestically and internationally. The findings can also be used as a model for further development of spa massage services.

MATERIALS AND METHODS

This research was a randomized controlled trial using the single blind technique. It was reviewed and approved by the TCTR committee on 03 February 2022. The TCTR identification number is TCTR20220203001. The participants were randomly assigned to either the experimental group or control group by computer program in blocks of four. The random numbers were placed in a sealed opaque envelope and arranged in random order. The experimental group was exposed to Tok Sen massage for relaxation, while the control group laid down in a comfortable environment without the massage. Muscle flexibility, assessed through the sit-and-reach test and the back-scratch test, and relaxation, were measured at the end of the massage.

Sit-and-reach test is a method for evaluating the flexibility of the lower back muscles, hamstring muscles, and hip muscles. To measure flexibility, the subjects were asked to sit on the floor with legs straight and heels closely attached to the measuring device. Then the subject slowly leans forward, stretching their arms tight and pushing both hands forward to tap the odometer. As this position is held for about 2 seconds, the research assistant reads the measured value.

This is the distance that the subject is most likely to touch. It determines the elongation distance of the person. If the tip of the finger goes beyond the tips of the toes (on a scale equal to 0) to the measured value is +....cm. However, if the fingertips do not reach the toes, the reading value is -....cm. Then, this data is compared with normative data for the test for both male and female members of the Thai population (Jamjun, 2015). Regarding interpretation of the results, a very high positive measurement indicates that the muscles are very flexible.

The back-scratch test is a method for assessing the flexibility of the muscles in the shoulders, shoulder blades, chest, and arms, using a ruler or tape measure. The test involves having the subject raise their right arm above their shoulder, and then bend the elbow down so that the palm and fingers touch the back as much as possible (hand facing down). The left arm is bent at the elbow and raised to the highest point (hand facing up), while trying to keep the fingers of both hands as close and overlapping as possible (right hand over left hand) and measure the other side by alternating the left arm above the shoulder and the right arm is bent at the elbow. Then, the distance between the tips of the middle fingers of both hands is measured. If they touch each other, the distance is 0. If the fingers or hands overlap, the distance is + cm. If the fingers do not touch each other, the distance is - cm. Regarding interpretation of the results, a very high positive measurement indicates that the muscles are very flexible.

The relaxation assessment form is an assessment form that the researcher modified from a visual analog scale in order to have the subjects self-assess their level of relaxation. Before and after the experiment, the scores were rated on a numerical rating scale of 0-10, where 0 means least comfortable and relaxed, and 10 means the most comfortable and relaxed.

Subjects

Participants were selected by purposive sampling between January to March 2022. The inclusion criteria were: 1. aged 20-60 years; 2. body mass index of 18.5-29.9 kg/m²; 3. for women, not in the menstrual period or pregnant; 4. no risk of contracting COVID-19; 5. no surgery history within the past month, no severe osteoporosis, no history of frequent fractures and no history of spinal cord disease; 6. blood pressure not higher than 140/90 mmHg, pulse not exceeding 100 beats per minute, normal breathing in the range of 12-20 breaths per minute,

body temperature not higher than 37.5 degrees Celsius, no abnormalities of bones, muscles or skin, no pain, swelling, redness, or hotness in any body parts, and no contagious diseases; 7. able to read, write and communicate in Thai clearly; and 8. willing to participate in the research. Exclusion criteria were: 1. a history of various types of cancer; 2. varicose veins; and 3. inflammation in the skin or around the organs of the body. Discontinuation criteria included injury from stroke, fainting, abnormal breathing, chest tightness, feeling uncomfortable or unwell, or other adverse events.

The sample size was calculated using the power analysis principle, using the G*power program 3.1.9.2. With the effect size from the previous study of .64, the alpha of .05, and the power of .80, the calculated sample size was 80 subjects. Therefore, this number of participants was selected and randomized into two groups of 40 each, one being the experimental group, and the other being the control group.

Research Instruments

1. Instruments for procedure

1.1 Tok Sen massage for relaxation. This is an innovative Lanna spa service for the public. It was developed by the research team together with parents - teachers, teachers who were experts in massage therapy, and spa operators in Chiang Mai who had signed a collaboration agreement with the Faculty of Nursing, Chiang Mai University and the Capital Management and Capital Management Unit for enhancing the country's competitiveness, to prepare manuals and standards in providing massage services for the public. The program was examined by a panel of experts and revised according to the suggestions until the massage menu for the Lanna spa service was suitable for the public. The whole massage takes 1 hour and 30 minutes, starting with 1) lying on one's back while the therapist hammers the front arm and leg, 2) lying on one's left side while the therapist hammers the inner left leg and the outside of the right leg, 3) lying on the right side, hammering the inner right leg and the outside of the left leg, 4) lying on one's stomach, hammering the back and the leg, and 5) in a sitting position, hammering the back. The hammer was of the same size. It had a non-rubber hammerhead and weighed approximately 236.5 ± 2.5 grams and a wedge weighed approximately 88.3 ± 1.5 grams.

The massage therapist who provided Tok Sen massage to the participants was required to have the following qualifications: 1) a qualification certificate in health services registered from the Department of Health Service Support, Ministry of Public Health; 2) 5 years or more of experience in massage therapy with training in massage therapy; 3) at least 2 doses of COVID-19 vaccination with negative ATK results; 4) basic resuscitation training from the Faculty of Nursing, Chiang Mai University; and 5) trained and assessed by experts to ensure the ability to provide Tok Sen massage correctly according to the patterns and methods developed based on the specified standards.

The Tok Sen massage menu for relaxation was examined by three experts: one teacher in the field of physiotherapy specializing in Tok Sen massage, one massage teacher at a spa school, and one orthopedic doctor. The research team adjusted the menu according to the recommendations of experts. Then, the program was tested with three people who had similar characteristics to the study sample. Follow ups were conducted on adverse events immediately and at 24, 48, 72 hours and 1 week after receiving the massage.

2. Instruments for data collection

2.1 A screening form was developed by the researcher based on the inclusion criteria for the sample.

2.2 The case record form consisted of two parts: demographic form and pre-posttest muscle flexibility record form. It was reviewed by three experts and revised following the suggestions.

2.3 The relaxation assessment form was adapted by the researchers from a visual analog scale. Participants were asked to assess their level of relaxation before and after the experiment. The scores are rated on a numerical rating scale of 0-10 where a score of 0 represents feeling the least comfortable and relaxed, and 10 represents feeling the most comfortable and relaxed. This form was reviewed by three experts and adjusted according to recommendations. It was tested on 10 individuals with the same characteristics as the sample using the test-retest method, yielding a reliability coefficient of .80.

2.4 The Omron HEM-7156 automatic blood pressure and pulse monitor was calibrated for accuracy of standard measurements prior to use.

2.5 A 30 cm-long ruler was used for the back-scratch test.

2.6 The Sit-and-Reach Tester was calibrated for accuracy of standard measurements prior to use.

All research assistants who performed data collection were trained and tested for administration of the back-scratch test and the sit-and-reach test with 10 participants similar to the study participants. Inter-rater reliability was determined, yielding a value equal to 1.

Human Subjects

To protect participants' rights, the research project was presented to the research ethics committee of the Faculty of Medical Technology, Chiang Mai University, to consider ethical issues in human research. The document and project were numbered 13/2565 and AMSEC-64EX-126, respectively. Upon receiving approval to conduct the research, the participants were informed of the objectives, and the process of research and data collection. All information obtained from the research was kept confidential and anonymized. The results were presented as aggregated results for educational purposes only. Participants were asked for cooperation in the research voluntarily without coercion. All of them gave written consent to participate in the research. The researchers protected the rights of the participants by letting them read the research information, and explaining to the participants that they could decide to participate in the research voluntarily and could refuse or terminate participation in the research at any time without giving reasons. Termination of participation did not affect any services received by the participants. The spa facilities and equipment were prepared in accordance with the COVID-19 prevention and control measures of the Department of Disease Control Ministry of Health. The participants in the control group will receive the Tok Sen massage for relaxation, the same as the experimental group received, after the period of the research intervention has ended, or they could make an appointment for receiving the massage whenever it was convenient for them.

Data Collection

The demographic data and pretest of blood pressure, heart rate, flexibility of muscles, flexibility in a sit-and-reach test and back-scratch test (left and right), and relaxation were recorded for both groups before beginning the intervention in a room arranged in the spa. The participants who were randomly assigned to the experimental group received the Tok Sen massage in a prepared room following the Tok Sen massage for relaxation manual, and this took about 1 hour and 30 minutes. The temperature of the room was appropriate according to their needs, while the participants in the control group laid down in a comfortable environment in the supine and prone position like the experimental group for 1 hour and 30 minutes without the massage. At the end of the intervention, the posttest was used for measurement. For the experimental group, adverse outcomes were assessed immediately, and this was followed up on at 24 hours, 48 hours, 72 hours, and 1 week after receiving the massage.

Data Analysis

The researchers employed the following statistics for data analysis.

1. Personal data were analyzed using descriptive statistics including frequency, percentage, mean, standard deviation, median, and interquartile range. Differences between groups were compared with Fisher's exact test, independent t-test, and the Mann-Whitney U test.

2. The differences in muscle flexibility between the experimental group and the control group were compared using the Mann-Whitney U test.

3. The differences in relaxation scores between the experimental group and the control group were compared using independent t-test statistics.

RESULTS

Part 1: Demographic data

Most of the participants in both groups were female. The subjects in the experimental group had a mean age of 36.50 years (sd = 9.94), a median weight of 64.50 kg (iqr = 17.20), a mean height of 165.26 cm (sd = 7.16), and a median BMI of 22.77 kg/m² (iqr = 4.49). The subjects in the control group had a mean age of 34.25 years (sd = 8.25), a median weight of 58.0 kg (iqr = 22.95), a mean height of 163.18 cm (sd = 9.01), and a median BMI of 22.79 kg/m² (iqr = 5.94). When comparing the personal data of the experimental group and the control group, it was found that the sex, age, weight, height, and body mass index of both groups were not different as shown in Table 1.

Table 1. Demographic characteristics of the subjects (n=80).

Characteristics	Experimental (n=40)		Control (n=40)		P-value
	n	%	n	%	
Gender					
Male	14	35.00	11	27.50	0.630
Female	26	65.00	29	72.50	
Age (years)					
Mean (SD)	36.50	(9.94)	34.25	(8.25)	0.274
Weight (kg)					
Median (IQR)	64.50	(17.20)	58.00	(22.95)	0.630
Min–Max	44–85		45–98		
Height (cm)					
Mean (SD)	165.26	(7.16)	163.18	(9.01)	0.255
BMI (kg/m ²)					
Median (IQR)	22.77	(4.49)	22.79	(5.94)	0.985
Min–Max	16.16–33.20		17.15–38.05		
Systolic BP (mmHg)					
Pre-Median (IQR)	112.50	(23.00)	120.00	(17.50)	0.459
Post-Median (IQR)	115.50	(27.50)	122.00	(23.00)	0.567
Diastolic BP (mmHg)					
Pre-Median (IQR)	79.50	(12.00)	81.00	(13.50)	0.479
Post-Median (IQR)	78.50	(14.00)	81.00	(13.00)	0.547
Heart rate (bpm)					
Pre-Median (IQR)	77.50	(16.00)	79.50	(15.50)	0.682
Post-Median (IQR)	75.00	(16.00)	75.00	(14.00)	0.802

Part 2: Comparison of muscle flexibility with the sit-and-reach test and the back-scratch test between the experimental group and the control group

At pre-test, the flexibility of the lower back muscles, hamstring muscles, and hip muscles was assessed using the sit-and-reach test. The flexibility of the muscles in the shoulders, shoulder blades, chest, and arms was assessed using a left and right back-scratch test. Results showed no significant differences between the experimental group and the control group ($P > .05$) as shown in Table 2.

At post-test, the changes in the flexibility of the lower back muscles, hamstring muscles, and hip muscles which were compared using the sit-and-reach test showed a statistically significant difference between the experimental group and the control group (2.0 ± 2.05 vs. 0.45 ± 4.85 , $P = .004$), as shown in Table 2.

Changes in the muscle flexibility in the shoulders, shoulder blades, chest, and arms (both left and right sides), which were compared using the back-scratch test, show a statistically significant difference between the experimental group and the control group (left side, 2.0 ± 3.25 vs. 0.0 ± 2.25 , $P < .001$; right side, 1.45 ± 3.0 vs. 0.0 ± 1.75 , $P = .001$), as shown in Table 2.

Table 2. Comparison of muscle flexibility with the sit-and-reach test and the back-scratch test between the experimental group and control group.

Flexibility	Experimental (n=20)	Control (n=20)	P-value
Sit-and-Reach Test (cm)			
Pre-test Median (iqr)	4.10 (12.65)	2.10 (17.35)	0.900
Min–Max	-17.10 – 20.00	-16.50 – 20.50	
Pre-test Median (iqr)	5.65 (9.90)	1.75 (16.35)	
Min–Max	-16.80 – 22.80	-17.50 – 21.00	
Difference Median (iqr)	2.00 (2.05)	0.45 (4.85)	
Min–Max	-3.20 – 7.70	-5.90 – 5.90	
Back-Scratch Test (cm): Left			
Pre-test Median (iqr)	-0.75 (9.25)	0.50 (12.00)	0.668
Min–Max	-27.00 – 13.00	-20.00 – 9.00	
Pre-test Median (iqr)	1.00 (9.50)	-3.00 (12.25)	
Min–Max	-23.00 – 11.50	-13.50 – 12.50	
Difference Median (iqr)	2.00 (3.25)	0.00 (2.25)	
Min–Max	-4.50 – 7.50	-6.00 – 13.00	
Back-Scratch Test (cm): Right			
Pre-test Median (iqr)	1.25 (9.00)	3.00 (12.50)	0.550
Min–Max	-18.00 – 17.00	-9.00 – 16.00	
Pre-test Median (iqr)	5.00 (8.75)	2.50 (10.25)	
Min–Max	-16.00 – 14.50	-9.00 – 16.00	
Difference Median (iqr)	1.45 (3.00)	0.00 (1.75)	
Min–Max	-3.50 – 10.50	-9.50 – 4.50	

Note: Comparison of differences between experimental and control groups using the Mann–Whitney U test

Part 3: Comparison of relaxation between the experimental group and the control group

At pre-test, the mean scores for relaxation between the experimental and control groups were compared. Results showed no significant differences between the groups ($P > .05$) (Table 3). At post-test, there were significant differences in the mean scores for relaxation between the experimental and control groups ($P < .001$), as shown in Table 3.

Table 3. Comparison of relaxation between the experimental and control groups.

Relaxation (score 0-10)	Experimental (n=40)		Control (n=20)		P-value
	Mean	SD.	Mean	SD.	
Pretest	4.45	1.39	4.10	1.71	0.912
Posttest	8.68	1.16	6.25	1.96	<0.001

Part 4: Adverse reactions after the massage for the experimental group

Adverse reactions occurred in 11 out of 40 participants, representing 27.50%. The symptoms included slight pain in the shoulder or scapular (8), red marks on the skin (1), muscle spasms (1) and feeling tired (1). However, those symptoms gradually improved and disappeared on the first or second day after the massage. At the follow-up assessment on the seventh day after the experiment, no symptoms were found.

DISCUSSION

After using the Tok Sen massage for relaxation, participants in the experimental group were able to move their joints and muscles in the posterior thigh, hip, shoulders, scapula, chest, and arms better and felt more relaxed with statistical significance when compared with the control group ($P < .01$) indicating the effectiveness of the Tok Sen massage for improving flexibility in muscles in various body parts, resulting in better joint and muscle movement. A possible explanation is that the Tok Sen massage relies on the speed of hammering on the area of the pain. It works similarly to the activator method technique, which is a technique used by chiropractors to treat patients using an instrument called the Activator Adjusting Instrument to press down on the muscles of the patient in pain, and which is stimulated by high-speed tools. This results in reduced pain in the back, neck, and other areas [Huggins et al., 2012]. The function of this instrument involves pressing with a small, quick, but mild, high-velocity, low-amplitude trust instrument onto the area of the pain. High speed stimulation causes the muscles to relax [Minx, 2020] or be flexible.

Although the exact mechanism of the massage effect cannot be directly explained, possible mechanisms for explanation are biomechanics and physiology. According to biomechanics, a regular rhythmic, medium-strength hammering massage is similar to the oscillation of biological tissue, which changes the communication between cells. A transfer mechanism arises because of the conversion from mechanical signals to electrical signals within the cell, which can cause tissue softening [Wang, 2006]. Regarding the physiological mechanism, the percussion transmits vibrations to the myofascial components of the skeletal muscle. Mechanical forces enhance peripheral capillary dilation [Mei et al., 2010] and increase blood flow, causing more blood to feed the muscles and the removal of muscle waste, resulting in better muscle relaxation and function. It also results in a more flexible muscle fascia by increasing the muscle threshold, which has a mechanism for reducing muscle pain, like the pain gait theory, which increases tissue flexibility and reduces nerve and vascular stress [Imtiyaz et al., 2014]. As a result, those who received the Tok Sen massage for relaxation were able to have a range of motion (ROM: Range of Motion) of the joints and muscles in the lower back, back thighs and hips measured with the sit-and-reach test, as well as the joints and muscles in the shoulders, scapula, chest, and arms measured by the back-scratch test method. This result is congruent with a previous study [Imtiyaz et al., 2014] which found muscle soreness after exercise significantly less for an experimental group who received vibration and massage ($P = 0.000$). Moreover, after the massage, the participants in the experimental group of this study experienced a feeling of increased relaxation with significance ($P < .001$), when compared to before the massage and compared with the control group. This

is congruent with the findings of another previous study [Vambheim et al., 2021] which shows a variety of relaxation techniques, including massage, that can increase relaxation, reduce anxiety and pain intensity, improve physical functioning, and have a significant effect including an improved range of motion in exercise and levels of activity, and improved quality of life.

IMPLICATIONS

From the research findings, health spa business operators and agencies, such as the Thai Lanna Spa Association and the Thai Spa Association, as well as spa operators in other countries, can apply the Tok Sen massage menu for relaxation, which has been developed and tested for efficacy in this study, for providing services to add value to their own businesses. In addition, academics can apply the findings on Tok Sen massage therapy for relaxation in teaching about services for other populations and for conducting further research to expand knowledge in this area.

CONCLUSION

The purpose of this research was to study the effect of using Tok Sen massage for relaxation on muscle flexibility and relaxation in people who received the Lanna spa treatment for health tourism. The findings showed that the use of Tok Sen massage for relaxation could increase the flexibility of the muscles in the posterior thigh, hip, shoulders, scapula, chest, and arms, as well as promote a feeling of relaxation.

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AUTHOR CONTRIBUTIONS

Nantaporn Sansiriphun contributed to the study design, data collection and analysis, and manuscript writing. Jirawan Deeluea, Preeyakamon Krikirat, and Areewan Klunklin performed data collection and analysis. All authors have read and approved of the final manuscript.

CONFLICT OF INTEREST

The authors declare that they hold no competing interests.

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