Original article

Effect of Thai traditional massage on quality of sleep, stress, and muscle pain in patients with insomnia and muscle tension syndrome

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Abstract

Background: Insomnia is irregular sleep that is related to physical health, e.g., muscle tension, and mental health conditions, e.g., emotional problems, less concentration, stress, and depression. Mostly, insomnia and muscle tension syndrome can decrease sleep quality. In addition to the main treatment and medication, muscle relaxation is an alternative treatment to reduce muscle tension and improve sleep quality. Thai Traditional Massage is a muscle relaxation method.
Objectives: To compare the quality of sleep, stress, and muscle tension between patients with insomnia and muscle tension syndrome who received Thai Traditional Massage as the experiment group and non-received Thai Traditional Massage as the control group. In both groups, for four weeks, the experimental group received Thai Traditional Massage and treatment as usual but the control group received only treatment as usual.
Methods: A total of 40 insomnia patients with muscle tension syndrome were divided equally into the experiment group (n = 20) and control group (n = 20) by using block randomization. All subjects were asked to complete demographic data and medical information form, and the Thai version of measurements consisted of The Pittsburgh Sleep Quality Index (PSQI), the General Health Questionnaire – Stress measurement (GHQ-30), and the Short Form McGill Pain Questionnaire, the last three questionnaires were assessed before and after the study. The experiment group received treatment as usual and Thai Traditional Massage for four weeks. The control group received treatment as usual for four weeks.
Results: The results showed significant difference between groups of sleep quality ($P < 0.001$), stress ($P = 0.017$), pain levels ($P = 0.045$), and visual analog scale ($P = 0.002$) but characteristics of pain showed no difference. In the 4th week, the experimental group had a lower score than the 1st week on sleep quality, stress, characteristics of pain, pain levels, and visual analog scale. The mean score of sleep quality increased among the control group.
Conclusion: Thai Traditional Massage affected improve sleep quality, reduce stress, reduce pain levels, and visual analog scale among insomnia patients with muscle tension syndrome. Thus, the alternative method, Thai Traditional Massage should be considered for insomnia patients.

Keywords: Insomnia, muscle pain, muscle tension syndrome, quality of sleep, stress, Thai Traditional Massage.

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Insomnia is an abnormality of sleep that frequency found in the general population. It is a crucial issue for public health. Sleep problems are related to physical disorders, i.e., headaches, muscle aches, deterioration in physical and immune health, and related to mental health problems or psychiatric disorders, i.e., emotional problems, irritability, lack of concentration, stress, anxiety, and depression.[1] Prevalence of insomnia was found in 33.0 –50.0% of the general population, from this group 10.0 – 15.0% could lead to insomnia disorder and half of them lead to chronic insomnia disorder.[2] Sleep problems could bring the major risk factors for loss of function cause a physical condition or disease and related to mental health problems and psychiatric disorders. Patients incur additional health care costs. The causes and physiology of sleep problems involve genetic factors, environmental factors, behavioral factors, and physiological factors.

Diagnosis of sleep problems can be made by taking a history of sleep habits, psychiatric problems and conditions, a history of drug or substance abuse, and recording sleep patterns (sleep diary). Previous studies had shown that there are several effective treatments for sleep problems, including behavioral therapy, cognitive therapy, and medication.[3] In medical treatment, mostly used in the category of hypnotics and anxiolytics (sleeping pills or anti-anxiety drugs), which medication in the benzodiazepine category had effective. The limitation used, should be to take on the lowest dosage and shortest duration. Alternative treatment can encourage the patient with sleep problems to improve sleeping and less use that medication. Muscle relaxation is one alternative treatment that has a mechanism to help the patient with insomnia to improve their sleep by reducing muscle tension. These might be one of the causes that affect insomnia patients. Reducing the stress that can cause or provoke physical into a state of alertness or discomfort, pressure, and frustration, which makes the problem of insomnia worse. These include behavioral therapy, especially muscle relaxation exercises, one method that could be done, i.e., Thai Traditional Massage.

Thai Traditional Massage, results from previous studies, depicted to relax muscles, reduce muscle stiffness, and reduce muscle pain. Muscle pain's mean score decreased after receiving Thai Traditional Massage.[4] Also, this method could decrease stress, depression, and irritability.[5] Moreover, massage can reduce spasticity and muscle pain, anxiety, and depression, improve sleep quality, and improve the quality of life or well-being among patients with myofascial pain syndromes. Sleep quality improved by massage therapy within one month.[6] Massage therapy can reduce the amount of cortisol, the hormone that responds to higher stress among people who experience intense or prolonged stress, and increase the neurotransmitters, i.e., serotonin and dopamine, to reduce stress and sleep better.[7]

Most of the previous studies on the effect of massage therapy, mostly, had studied in foreign studies. In Thailand, a study on the application of massage in the form of Thai Traditional Massage to improve sleep quality and reduce stress, especially in an experimental study with a control group is still limited.

The objective of this study was to determine the effect of Thai massage on stress and sleep quality in patients with insomnia and muscle tension syndrome. We also aimed to improve the efficiency of treatment among the patients and reduce the use of sleeping pills and antianxiety drugs.

Materials and methods

Subjects and study design

The current study was an experimental study with a randomized controlled trial (RCT). The subjects were patients with insomnia and muscle tension syndrome at Chula Sleep Center and Outpatient Psychiatric Department, King Chulalongkorn Memorial Hospital.

The subjects were inspected following inclusion and exclusion criteria, up to the sample size that was calculated. The inclusion criteria, patients, aged 18 years or more, able to understand Thai communication by listening, speaking, reading, and writing, were diagnosed by a physician had insomnia and muscle tension syndrome that interferes with their life by having scored 6 or more from the Pittsburgh Sleep Quality Index (PSQI) and having discomforting levels from Thai Short-Form McGill Pain Questionnaire, and consent to participate in research studies. The exclusion criteria, patients, who were diagnosed by a physician with schizophrenia, other psychotic disorders, bipolar disorders, dementias, substance-induced, or organic mental disorders, having severe psychiatric symptoms, have a greater risk after receiving a Thai massage, cannot follow the instructions and volunteer care guidelines, or absent from the study without being able to be contacted for two consecutive times. For the medication treatment

information, patients received the medication according to their conditions and the researchers did not ask them about their received medication.

The researchers asked for the medical data from the physician who had the patient following the eligibility criteria to participate in the study. The patients were randomized by block randomization to divide into the experimental or control group, with 20 subjects in each group. Both groups had equally distributed the patients with insomnia and muscle tension syndrome. The experimental group that received Thai Traditional Massage was compared to the control group without the massage including quality of sleep, stress, and muscle pain score (Figure 1).

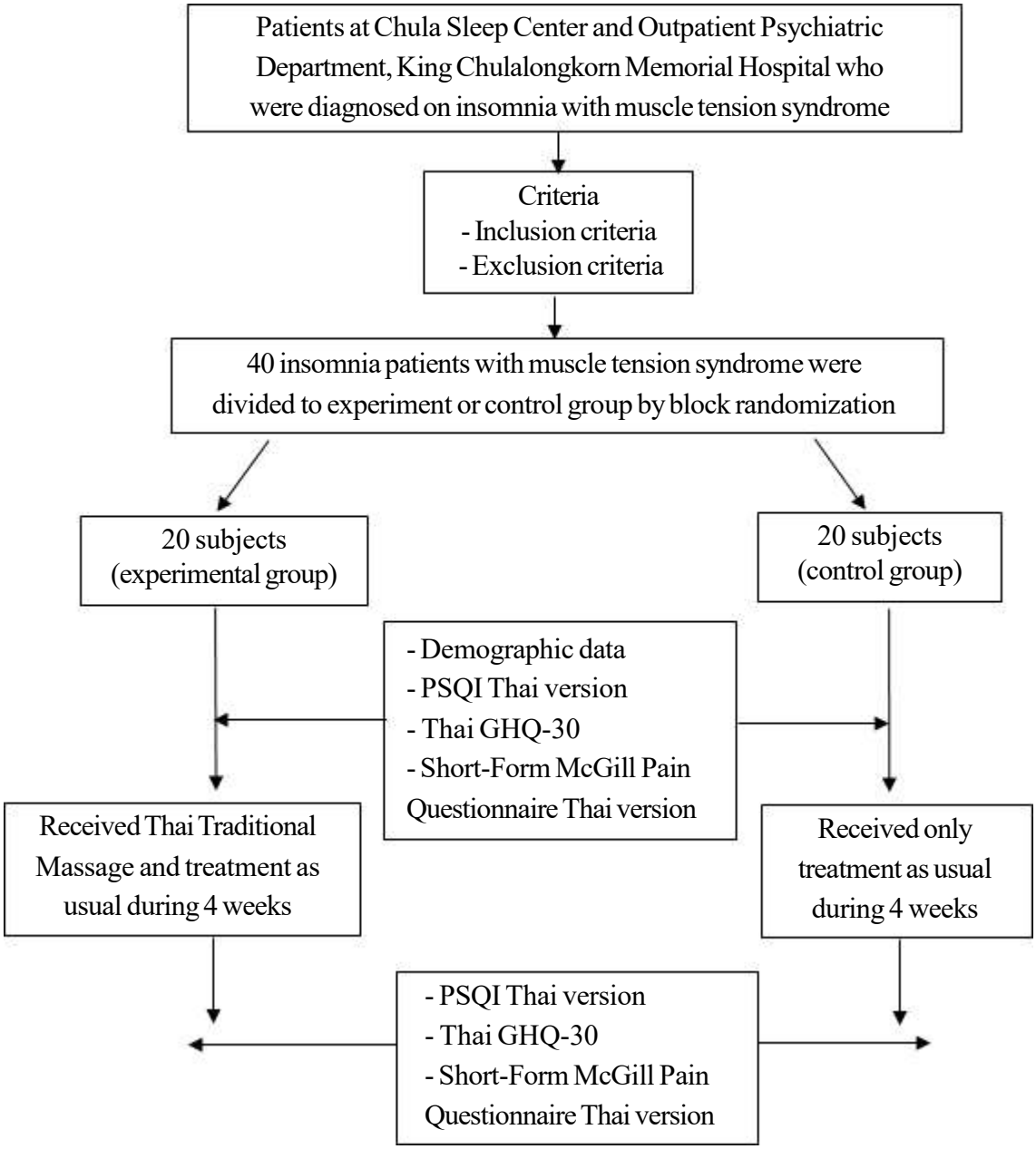

Figure 1. Study flow chart.

The Thai Traditional Massage was the treatment for patients with insomnia and muscle tension syndrome in the experimental group. They received the treatment for 40 minutes per time with the Thai Royal Massage and hot herbal compress, each time 1 week apart.

The patients were massaged by the researcher who educated from Bachelor of Applied Thai Traditional Medicine. In the first massage, the researcher interviewed and asked the patients to assess their sleep quality (PSQI), stress (GHQ-30), muscle pain (Short-form McGill), and measured their vital signs and the specific physical examination. After receiving the fourth massage, lastly, the patients were re-evaluated on sleep quality, stress, and muscle pain. The study was conducted at Outpatient Psychiatric Department, Phor Por Ror building 12th floor, King Chulalongkorn Memorial Hospital. The experiment group received treatment as usual and Thai Traditional Massage for four weeks, while the control group received only treatment as usual for four weeks.

The massage room for this experiment was private. The patient was allowed to massage the room one by one and the Thai Traditional massage was conducted only in the experimental group. The control group completed only the online questionnaires in the first week and last week due to the COVID-19 pandemic. Thus, the patients from the experimental group and control group did not have a chance to encounter each other. These will diminish the contamination of treatment.

The researcher measured to control the extraneous factors from the other massage therapy apart from the massage by the researcher. Thus, the researcher asked the patients to cooperate with the study and not to attend other physical therapy to relax muscles during the research except the treatment as usual, i.e., muscle stretching (compliance).

All subjects were patients with insomnia and muscle tension syndrome. They still received the treatment as usual, e.g., medication treatment or relaxation technique, except for the experimental group that received a Thai Traditional Massage and treatment as usual. After the end of the study, the control group will receive a Thai Traditional Massage similar to the experimental group (co-intervention). As mentioned above, the researchers conducted the experiment following the rule of 3cs to control the extraneous variables. Therefore, both groups were randomized without bias.

Measurements

Demographic data were completed by subjects, including gender, age, marital status, education, occupation, income, the average number of workdays per week, most of the daily gestures, congenital disease, and a family member's history of insomnia.

The personal medical data of subjects were recorded by the researchers. Data were the data record form of the Chula Sleep Center and Outpatient Psychiatric Department, King Chulalongkorn Memorial Hospital.

Sleep quality was interviewed by the 6-items of the Pittsburgh Sleep Quality Index (PSQI). Thai version developed by Jirapramukpitak T. and Tanchaisawat W.[8] This assessment contains 7 components including subjective sleep quality, sleep latency, sleep duration, sleep efficiency, sleep disturbance, use of sleep medication, and daytime dysfunction. The scores range from 0 to 21, a score > 5 was considered a significant sleep disturbance (poor sleep), and a score ≤ 5 was considered to sleep well. The validity of PSQI had as good with a sensitivity of 89.6% and specificity of 86.5%. Cronbach's alpha coefficient was 0.83.

General Health Questionnaire was developed by Goldberg and the Thai version (Thai GHQ-30) was developed by Nilchaikovit T, *et al*.[9] The questionnaire assessed stress and mental health problems. A score calculated from the 4-Likert score (0 - 3). The score interpretation Thai GHQ-30 used criteria the lowest cut-point was ¾ and a score ≥ be considered as irregular. The validity of Thai GHQ-30 had as good with a sensitivity between 78.1 - 85.3% and specificity between 84.4 - 89.7%. Cronbach's alpha coefficient ranged from 0.84 - 0.94.

Muscle pain was assessed by Short-Form McGill Pain Questionnaire that was adapted into the Thai version by Kitisomprayoonkul W, *et al*.[10] Questionnaires assessed 3 parts of the pain experience including: 1) characteristics of pain were divided into 11 emotional items and 4 emotional items, with each item score of 0 - 3, a total score was 45; 2) pain levels assessed from 6 levels, ranged 0 - 5, the total score was 5; and, 3) visual analog scale consists of a 100 millimeter (mm) and the total score was 100 mm. Cronbach's alpha coefficient was 0.79.

Procedure

The patients in the experiment group measured their vital signs before receiving a massage. In the

case of the patients who had a higher temperature than 38.5°C or higher blood pressure than 140/90 mmHg with dizziness, palpitations, nausea, vomiting, or headaches they were asked to rest for 10 minutes and re-measured the vital signs. They were asked to refrain on that week if they still had the conditions. After that, the Thai Royal Massage was applied. The subject in the experimental group were massaged around the shoulder, neck, and back for approximately 30 minutes and followed by the hot herbal compress for 10 minutes. The compress can reduce the soreness that occurs after the massage, also, increasing the efficiency of muscle relaxation.

Treatment as usual, as mentioned above, was medication treatment, physical therapy, and relaxation training that both groups received following their doctor's instructions. Thus, Thai Traditional massage was the additional massage that did not intervene in their treatment as usual.

Statistical analysis

The analyses were conducted by SPSS program version 22. The descriptive statistics were number, proportion, percentage, mean, maximum, minimum, and standard deviation (SD). The unpaired Student *t* - test was applied to compare the effect of Thai Traditional Massage. $P < 0.05$ was considered as significant difference.

Results

A total of 40 patients with insomnia and muscle tension syndrome were invited to participate in the current study to examine the effectiveness of Thai Traditional Massage. The block randomization was applied to divide them into 2 groups, 20 subjects were in the experimental group and 20 subjects were in the control group.

The demographic data, mostly, subjects in both groups were female (87.5%). The patient's ages ranged from 35 – 44 years old, mean age was 46.98 (± 14.35). The majority 47.5% of the subjects were single. Half of them received a Bachelor's Degree. Most of them had income, that ranged between 10,001 - 20,000 THB; their average income was 24,295 THB (± 21,026.62). Working had more than 4 days per week. The 47.5% had worked continuously on writing and computer use. Half of the patients had a congenital disease, especially, hypertension. Family members (30.0%) had a history of insomnia (Table 1).

Table 1. The number and percentage of demographic information among experimental group and control group.

Demographic information	Experimental Group (n = 20)		Control group (n = 20)		Total (n = 40)	
	N	%	N	%	N	%
Gender						
Male	2	10.0	3	15.0	5	12.5
Female	18	90.0	17	85.0	35	87.5
Age (year)						
< 35	5	25.0	4	20.0	9	22.5
35 – 44	6	30.0	5	25.0	11	27.5
45 – 54	3	15.0	4	20.0	7	17.5
55 – 64	4	20.0	4	20.0	8	20.0
≥ 65	2	15.0	3	15.0	5	12.5
Marital status						
Single	10	50.0	9	45.0	19	47.5
Couple (cohabitation)	9	45.0	9	45.0	18	45.0
Couple (not being together)	0	0.0	1	5.0	1	2.5
Widowed	1	5.0	1	5.0	2	5.0
Highest education						
Not study (Unlettered)	1	5.0	0	0.0	1	2.5
Primary school	4	20.0	4	20.0	8	20.0
Junior high school	1	5.0	0	0.0	1	2.5
High school	1	5.0	3	15.0	4	10.0
Bachelor's Degree	11	55.0	9	45.0	20	50.0
Postgraduate	2	10.0	4	20.0	6	15.0

Table 1. (Con) The number and percentage of demographic information among experimental group and control group.

Demographic information	Experimental Group (n = 20)		Control group (n = 20)		Total (n = 40)	
	N	%	N	%	N	%
Occupation						
Not working	6	30.0	5	25.0	11	27.5
Public service	2	10.0	3	15.0	5	12.5
State enterprises	1	5.0	3	15.0	4	10.0
Personal business	5	25.0	4	20.0	9	22.5
Employee	6	30.0	5	25.0	11	27.5
Income						
No	4	20.0	2	10.0	6	15.0
Yes	16	80.0	18	90.0	34	85.0
Average income/month (THB)						
≤ 10,000	6	30.0	3	15.0	9	22.5
10,001 - 20,000	7	35.0	5	25.0	12	30.0
20,001 - 30,000	3	15.0	6	30.0	9	22.5
> 30,000	4	20.0	6	30.0	10	25.0
Working day/week (day)						
≥ 5	16	80.0	15	75.0	31	77.5
3 - 4	2	10.0	3	15.0	5	12.5
Not working	2	10.0	2	10.0	4	10.0
Most of the daily gestures						
Sitting	5	25.0	4	20.0	9	22.5
Walking/Standing	6	30.0	6	30.0	12	30.0
Writing or use the computer continuously	9	45.0	10	50.0	19	47.5
Congenital disease						
No	11	55.0	9	45.0	20	50.0
Yes	9	45.0	11	55.0	20	50.0
Family member's history of insomnia						
No	15	75.0	13	65.0	28	70.0
Yes	5	25.0	7	35.0	12	30.0

Regarding personal medical data, 80.0% of subjects had depression. Most of them have taken medicine, antidepressants, sedatives/hypnotics, antipsychotics, and other medicine. Half of them had the past history of drug use, e.g., cigarettes and alcohol (Table 2).

Before the experiment or pre-test, the experimental group had higher mean scores than the control group on sleep quality and stress. The post-test mean score of the experimental group depicted lower than the pre-test in every variable, namely: sleep quality, stress, characteristics of pain, pain levels, and visual analog scale (Table 3).

The mean difference between groups was calculated from pre-test and post-test mean scores on sleep quality, stress, and muscle pain. The mean difference between pre-and post-test on sleep quality significantly between experimental and control groups was 5.40. The mean difference in stress was 4.50. Regarding muscle pain, the mean difference in characteristics of pain, pain levels, and visual analog scale were - 0.10, 0.45, and 1.70, respectively. Thus, after receiving Thai Traditional massage, the experimental group had a significantly higher mean different than the control group on sleep quality (95% CI = 3.18, 7.62, $P < 0.001$), stress (95% CI = 0.85, 8.15, $P = 0.017$), pain levels (95% CI = 0.01, 0.89, $P = 0.045$), and visual analog scale (95% CI = 0.69, 2.70, $P = 0.002$) (Table 4).

The results showed the effectiveness of the Thai Traditional Massage. Thus, after the end of this study, the patients in the control group received the Thai Traditional Massage. These could relieve their sleep quality, stress, pain levels, and visual analog scale.

Table 2. The number and percentage of the personal medical data among experimental group and control group.

Personal medical data	Experimental Group (n = 20)		Control group (n = 20)		Total (n = 40)	
	N	%	N	%	N	%
Psychiatric disease						
Depression	17	85.0	15	75.0	32	80.0
Anxiety	2	10.0	3	15.0	5	12.5
Panic	1	5.0	2	10.0	3	7.5
Drugs use history						
No	10	50.0	10	50.0	20	50.0
Yes	10	50.0	10	50.0	20	50.0
Medication history*						
Sedative/Hypnotics	17	85.0	16	80.0	33	82.5
Antidepressants	17	85.0	19	95.0	36	90.0
Mood stabilizers	6	30.0	8	40.0	14	35.0
Antipsychotics	16	80.0	15	75.0	31	77.5
Others	9	45.0	11	55.0	20	50.0

*patients may receive more than one medicine

Table 3. Mean scores and standard deviation (in brackets) of sleep quality, stress, and muscle pain, pre-test (0 week) and post-test (4th week).

Variables	Experiment group (n = 20)		Control group (n = 20)	
	Pre-test (0 week)	Post-test (4th week)	Pre-test (0 week)	Post-test (4th week)
Sleep quality	14.15 (2.03)	9.50 (3.55)	13.65 (3.69)	14.40 (3.20)
Stress	10.00 (7.79)	5.40 (3.68)	8.60 (3.50)	8.50 (3.86)
Characteristics of pain	10.90 (4.70)	9.00 (5.64)	13.50 (6.68)	11.50 (5.46)
Pain levels	2.25 (0.44)	1.55 (0.89)	2.55 (0.83)	2.30 (0.66)
Visual analog scale	4.36 (2.06)	2.63 (1.73)	4.58 (1.73)	4.54 (1.38)

Table 4. Comparisons of mean difference on sleep quality, stress, and muscle pain between groups.

Variables	Experimental Group (n = 20)		Control group (n = 20)		Mean Difference	SD	95% CI	*P*-value
	Mean	SD	Mean	SD				
Sleep quality	4.65	4.06	-0.75	2.75	5.40	1.10	[3.18, 7.62]	< 0.001*
Stress	4.60	7.54	0.10	2.90	4.50	1.81	[0.85, 8.15]	0.017**
Characteristic of pain	1.90	6.26	2.00	4.08	-0.10	1.67	[-3.50, 3.30]	0.953
Pain levels	0.70	0.86	0.25	0.44	0.45	0.22	[0.01, 0.89]	0.045**
Visual Analog Scale	1.74	1.88	0.04	1.17	1.70	0.50	[0.69, 2.70]	0.002**

*$P < 0.001$, **$P < 0.05$

Discussion

The results from the current study of the effect of the Thai Traditional Massage showed a significant decrease in the sleep quality and stress mean scores. According to Kwanriem N, *et al*.[11] the development of a mixed massage program by integrating the Royal Thai and Chinese acupressure techniques to improve sleep quality and reduce stress. Therefore, the relation between sleep quality and stress was inverse, in other words, the lower stress improved the quality of sleep. One method to diminish stress was theThai Traditional Massage. [12] Moreover, the massage significantly reduced pain levels and visual analog scale following Naewboot J.[13], the volunteer group had lower pain levels after receiving the Thai Traditional Massage.

Regarding muscle pain, the researchers investigated the characteristics of pain, pain levels, and visual analog scale. The results significantly revealed on pain levels and visual analog scales except for characteristics of pain. It might be involved with the patients to rate their pain in some characteristics that they had no pain. Consequently, they cannot rate that pain on various terms, e.g., muscle pain and nerve pain. Pain levels and visual analog scale were exposed in the same direction. The visual analog scale, especially, had a higher correlation with pain.[14]

The results displayed the correlation between stress, sleep, and muscle pain. A stressful person could easily occur muscle tension than usual, especially in the muscles in the upper body. It is more sensitive to pain than normal people. The muscles around the shoulder, neck, and shoulder, stressed people, had more contraction. These muscles relate to breathing. The muscles in this part are the muscles that support the movement of the diaphragm. When these muscles contract. The movement of the diaphragm will change, as a result, the nature of breathing changes from usual. It is characterized by shortness of breath and more frequent breathing. This condition is similar to when we are stressed. The body responds more easily to this stressful stimulus. Stress has affected sleep quality and led to sleep issues. Insomnia also triggers the body to respond more easily to stress and pain. Stress, insomnia, and muscle spasms have a mutually critical effect on each other. Thus, reducing muscle tension can improve sleep quality and reduce stress according to relaxation techniques. Insomnia patients with muscle tension were taught to follow comfortable posture, deep breathing, stretch their stiff muscles, and arrange their physical condition to be more relaxed. The previous study showed that massage can relieve sleep quality, and reduce stress, and pain.

Results from the current study depicted the effectiveness of the Thai Traditional Massage on muscle relaxation. Moreover, in this study, the authors used a hot herbal compress as a muscle relaxant and relieve pain. [15] The authors decided to study the Thai Traditional Massage by following Kwanriem N, *et al*.[11] However, the authors were massaged on the shoulders, neck, and back because these regions were related to stress. In other words, the Thai Traditional Massage can minimize the duration of a medical procedure. We applied herbal compress for muscle relaxants and reduced massage injuries instead of the Chinese acupressure technique. Normally, the herbal compress technique has practical in a Thai traditional medical clinic. So, it was convenient to apply Thai Traditional Massage in the medical clinic. This alternative technique can promote higher sleep quality, and reduce stress, and pain among patients with insomnia and muscle tension syndrome. Consequently, they will take lower sleeping pills, more muscle relaxation, and healthy.

In the future studies, the researcher should be concerned about the patient's symptoms. Both groups had a similar level of symptoms or primary insomnia without any kinds of psychiatric disease. Next, measuring muscle and nerve pain on the characteristics of pain might be grouped to muscle pain or using only the visual analog scale for pain measuring.

The current study had some limitation. This study did not measure the quality of sleep, stress, in on the 2nd week. The future study should be extend the period of receiving the Thai Traditional Massage for 6 - 8 weeks. Regarding pain assessment, the visual analog scale showed accurate pain classification and was easy to understand. Moreover, the quality of life should be considered for assessing the patients.

Conclusion

In addition to the main treatment, the Thai Traditional Massage was effective to improve the quality of sleep and can reduce stress, pain levels, and visual analog scale, among patients with insomnia and muscle tension syndrome. It will benefit the patients; It requires less medications, and saves costs.

Conflicts of interest statement

Each of the authors has completed an ICMJE disclosure form. None of the authors declare any potential or actual relationship, activity, or interest related to the content of this article.

Data sharing statement

The present review is based on the references cited. Further details, opinions, and interpretation are available from the corresponding authors on reasonable request.

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