International Journal of AAYUSH and Traditional Medicine

Research Article | Volume 3 Issue 1
DOI: 10.46619/ijaatm.2023.3-1025

Effectiveness of Oriental Massage on Daily Living Activities of Stroke Patients: A Systematic Review and Meta-Analysis

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Received: July 17, 2023; Accepted: July 28, 2023; Published: August 04, 2023

ABSTRACT

INTRODUCTION

Oriental massage can improve activities of daily living (ADL) and health outcomes in other chronic illness populations, yet similar studies are lacking in stroke populations. This study aimed to examine the effectiveness of oriental massage on ADL in patients with stroke.

METHODS

This study was a systematic literature review and meta-analysis and searched the primary research studies published electronically in Thai and English through five databases: ThaiJO, Thai National Research Repository (TNRR), PubMed, Science Direct, and Google Scholar. We analyzed data using RevMan version 5.4 by forest plot graphs. The confidence interval was calculated at the 95% level, and the heterogeneity was tested by Cochran's Q and I^2.

RESULTS

We identified seven relevant studies that performed ADL on stroke patients after receiving Thai or Chinese massage therapy interventions. We found that Thai and Chinese massage were applied together, emphasizing pressing, rolling, squeezing, gripping, bending, and pulling and herbal compress, which can increase blood flow and reduce muscle spasms. These findings suggest that the duration of massage at 3-weeks and 6-weeks follow-ups can be restored and improve the ability to perform ADL in stroke patients.

Citation: Pitchanan Thiantongin, Effectiveness of Oriental Massage on Daily Living Activities of Stroke Patients: A Systematic Review and Meta-Analysis. Int J AAYUSHY Trad Med 3(1): 20-29.

CONCLUSION

The results could heighten interdisciplinary healthcare teams, caregivers, and policymakers' awareness of providing appropriate Thai or Chinese massage as an adjunct and alternative to rehabilitate patients, ADL, and stroke outcomes.

KEYWORDS

Massage, Complementary Therapies; Daily Living Activities; Stroke; Meta-Analysis

INTRODUCTION

A stroke is a severe disease-causing death or disability. According to the world mortality statistics reported by the World Health Organization (WHO), stroke was the second leading cause of death after ischemic heart disease in 2019 [1]. In Thailand, stroke was the second leading cause of death after cancer in 2019 [2]. The mortality rate of 43.3 per 100,000 populations in 2015 increased to 53.0 per 100,000 populations in 2020 [3]. The main symptoms are sudden numbness or weakness in the face, arm, or leg, especially on one side of the body, confusion, trouble speaking or understanding speech, sudden trouble seeing, walking, loss of balance, dizziness, and severe headache [4]. Such disorders are primarily found in people with high blood pressure, diabetes, hyperlipidemia, and those who smoke [5].

Patients with an embolic stroke can be treated by giving drugs to dissolve blood clots and increase blood flow to the brain. Surgery to stop blood flow to the brain is preferred in patients with hemorrhagic stroke [6]. Then the rehabilitation of brain function to return to a typical or better condition as soon as possible is required so that patients can help themselves or perform activities of daily living (ADL) and minimize dependence on others or family members. For the rehabilitation of patients, research reports from many countries have pointed out the use of complementary medicine combined with modern medicine, especially in oriental massage, such as traditional Chinese massage, called Tuina. As for the treatment of traditional Thai medicine and complementary medicine in Thailand, Thai massage and Thai royal massage are used. For example, the study of Thai massage and the persimmon leaf compress showed that the patient's ability to perform ADL before and after the experiment was different, with a statistical significance of $p < 0.001$ [6]. In addition, a study on the effectiveness of Thai massage compared to physiotherapy in treating 50 stroke patients with muscle spasticity was divided into two groups: traditional Thai massage (TTM) and conventional physical therapy (PT). After the 6-weeks study, both groups had a one-point drop in the modified Ashworth Scale, their ability to perform ADL, and quality of life (QOL), but there was no difference between the groups. Anxiety and depression tended to decrease in the TTM group [7].

Therefore, it can be seen that oriental massage in Thailand and China is another option for the rehabilitation of stroke patients to be able to perform their ADLs. However, past research reports found that massage for the rehabilitation of stroke patients had different forms of massage and duration. We were interested in studying the effectiveness of massage on the ability to perform ADL in stroke patients by systematic review and meta-analysis to conclude massage style, duration, and frequency. This is to be used as a guideline for applying the massage model to treating patients in the future.

MATERIALS AND METHODS

Search Strategy

This study was a systematic literature review and meta-analysis of the effectiveness of oriental massage on stroke patients' daily living activities. We searched the research papers published electronically, consisting of databases in Thailand, including ThaiJO, Thai National Research

Repository (TNRR), and international databases, namely PubMed, Science Direct, and Google Scholar. The keywords used in the search were based on the PICO system, namely P: Stroke patients, Post-stroke I: Massage, Thai massage, Chinese massage, Tuina massage C: Control group O: Activities of daily living, Barthel index (BI), Modified Barthel index (MBI) and the conjunctions “and," “or” and “not." BI is an assessment scale that assesses stroke patients' ADL, with ten items with a total score of 100 points. MBI assesses stroke patients' daily living activities with ten items with a total score of 100 points. BI improved it with more detailed descriptions of the index in questions. From the literature review, both BI and MBI were used. Moreover, a study by Wang et al. [8] compared BI and MBI and found that MBI was better in assessment. Therefore, MBI is recommended for clinical trials to assess the effectiveness of stroke patients' ADL.

The research selection was conducted by two researchers independently. In case of disagreement, the third researcher would make the decision. The inclusion criteria and the exclusion criteria were as follows. Inclusion criteria were 1) Research examining the outcomes of the ability to perform the ADL of stroke patients, 2) Experimental or quasi-experimental research with two group pretest-posttest design, 3) Sufficient data details that can be used for meta-analyses such as mean, standard deviation, the sample size of both the experimental group and the control group, and 4) It is a research study that has a pattern of massage or acupressure using fingers, ridges of hands, arms, elbows, knees, and feet from the science of oriental massage. Exclusion criteria were 1) Experimental or quasi-experimental research with one group pretest-posttest design, 2) Review articles, systematic literature review, and meta-analysis, and 3) Published in languages other than Thai and English.

Search Outcomes

According to the data searched from the databases and predefined keywords, 876 related research studies were found. Then the studies selected the research based on the inclusion criteria and the exclusion criteria by considering the title, the abstract, and the full research report. Finally, seven studies with sufficient data for meta-analysis were selected. In addition, the researchers conducted subgroup analysis, including Thai massage and Chinese massage affecting the ADL of patients (Figure 1).

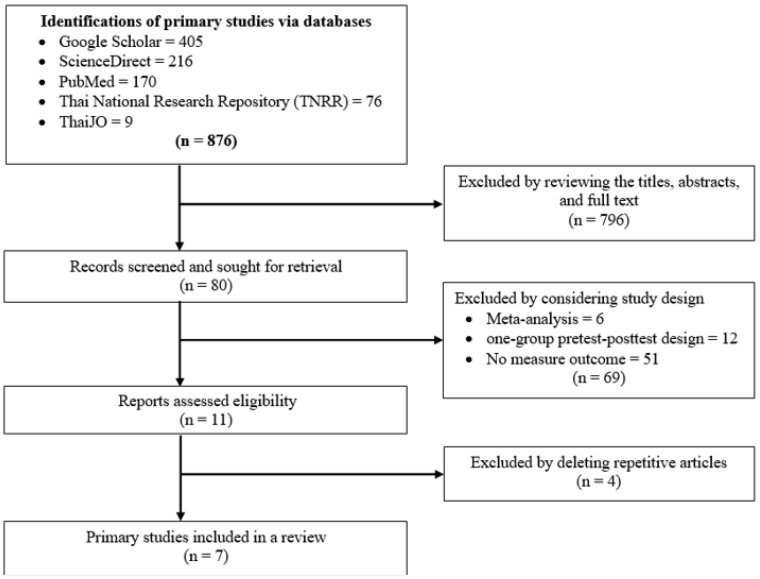

Figure 1: Flowchart of study selection for meta-analysis.

Quality Appraisal

The selected studies used funnel plots to analyze publication bias and assess heterogeneity by analyzing I^2 values using RevMan version 5.4. Assessment of research-based bias using The Cochrane Collaboration's quality assessment tool for assessing risk for bias [9]. The seven types of bias were evaluated and divided into low-risk, high-risk, or unclear risk. The assessment results were 57.14% for random sequence generation (selection bias) and allocation concealment (selection bias). Three studies did not explain the blinding of participants and personnel (performance bias) and blinding of outcome assessment (detection bias), therefore finding a high risk. The experiments by massage or rehabilitation of patients cannot be concealed, especially in the evaluator, which affects the measurement of various outcomes. However, it was a low risk for incomplete outcome data (attrition bias), selective reporting (reporting bias), and other biases (Figure 2).

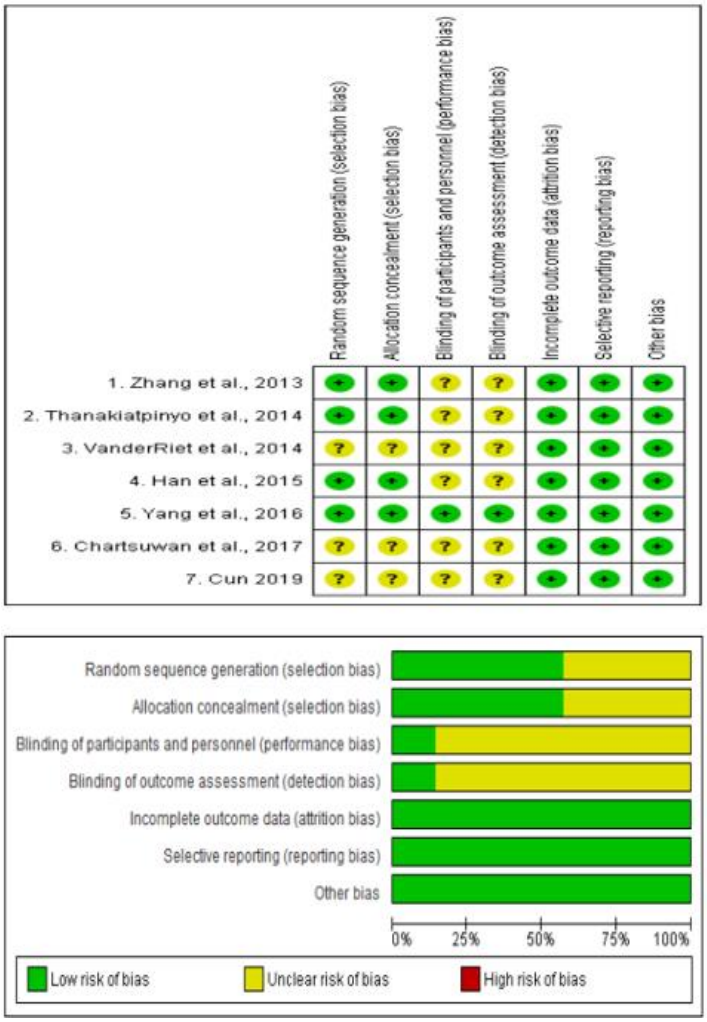

Figure 2: Risk of bias graph and summary.

Data Extraction

From a systematic literature review, the studies with the following topics were selected: author, country of study, research design, tool, sample group, intervention, recovery period, and study results, as presented in Table 1.

Author and country	Study design	Tools	Period (weeks)	Intervention group				Control group				Results
				Massage	n	Mean	S.D.	Control	n	Mean	S.D.	
Thanakiatpinyo et al. [7] Thailand	Randomized controlled trial	BI	0-6	TTM	24	16.4	4.3	PT	26	10.9	6.6	TTM group had higher BI scores than the PT group and increased significantly at week 6 compared with baseline in both groups.
Xie [11] China	Quasi-experimental research	MBI	0-4	Tuina + modern rehabilitation	44	33.59	11.13	PT	49	25.77	9.32	The MBI score of the intervention group was higher than that of the control group.
Van Der Riet et al. [12] Thailand	Quasi-experimental research	BI	0-12	TTM + hot compress	20	13.8	11.9	PT	20	11.7	15.2	The intervention group had significant improvement in ADL at 3 months compared to the control group.
Chartsuwan et al. [13] Thailand	Quasi-experimental research	MBI	0-4	TTM + PT	34	74.62	18.27	PT	34	65.29	16.1	PT combined with TTM + PT had the basic ADL of patients improve significantly.
Han et al. [14] China	Quasi-experimental research	MBI	0-3	Tuina massage + medicinal herbs	110	82.59	15.14	Anti-spasticity rehabilitation	110	71.13	14.7	MBI scores were more significant in the treatment group than in the control group.
Zhang et al. [15] China	Randomized controlled trial	BI	0-12	Integrated Rehabilitation Techniques of Traditional Chinese Medicine	42	83.1	20.75	Conventional rehabilitation	19	78.95	26.96	BI was increased in both groups on days 21 and 90, compared with the baseline (day 0), but no statistical difference.
Yang et al. [16] China	Randomized, placebo-controlled trial	MBI	0-12	Tuina massage	33	65.8	23.47	Placebo-Tuina massage	38	68.66	19.21	The MBI showed no significant difference between the two groups.

Table 1: Characteristics of the selected research.
Note: BI: Barthel Index; MBI: Modified Barthel Index; TTM: Thai Massage; PT: Physical Therapy; ADL: Activities of Daily Living

Data Analysis

The experimental and control groups' data were presented based on the selected research studies. The results were continuous outcomes, reported by Mean and Standard Deviation. The data were analyzed using RevMan version 5.4 by forest plot graphs, presented in Mean Difference or Std. Mean Difference. The confidence interval was calculated at the 95% level, and the heterogeneity was tested by Cochran's Q and I^2. The statistical significance was set at the 0.05 level. The acceptable I^2 criteria were as follows [10]: Not be important (0%-24%), low heterogeneity (25%-49%), medium heterogeneity (50%-74%), and high heterogeneity (75%-100%).

RESULTS

Of 876 articles identified, seven articles meeting the criteria were included in this systematic review. The primary research studies were published between 2013 and 2019, including four quasi-experimental studies [11-14] and three randomized controlled trials (RCTs) [7,15,16]. These include studies conducted in China (n = 4) [11,14-16] and Thailand (n = 3) [7,12,13]. The sample sizes of the seven studies ranged from 19 participants to 49 participants, and the duration of Thai or Chinese massage therapy interventions ranged from 3 weeks to 12 weeks. In addition, the analysis results of the ability to perform the ADL of stroke patients after receiving three types of massage therapy were as follows.

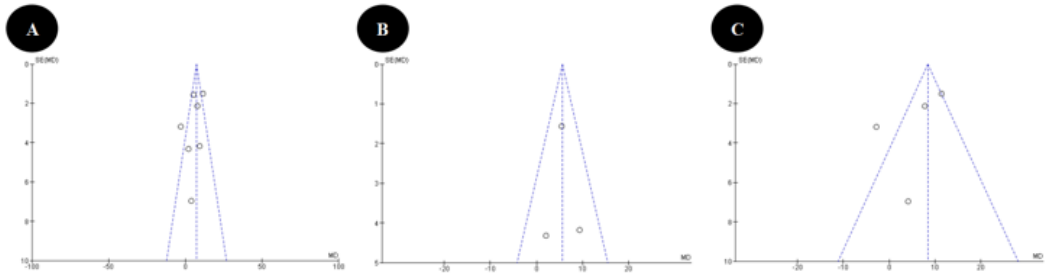

Figure 3: Funnel plot analysis: (A) Thai and Chinese massages, (B) Thai massage, and (C) Chinese massage.

Thai or Chinese Massage Therapy

From the analysis results of the ability to perform daily activities of stroke patients after receiving Thai or Chinese massage therapy in 7 studies, there were 603 samples. There was an asymmetrical funnel plot, as shown in Figure 3 (3A),

so this study was prone to publication bias. The meta-analysis results revealed high heterogeneity (I^2 = 77%). Therefore, the study results were analyzed by the random-effects model. It was found that the scores on BI were statistically different from those who did not receive massage therapy. The Std. Mean Difference was 0.51 (95% CI: 0.14-0.87) (Figure 4) (4A).

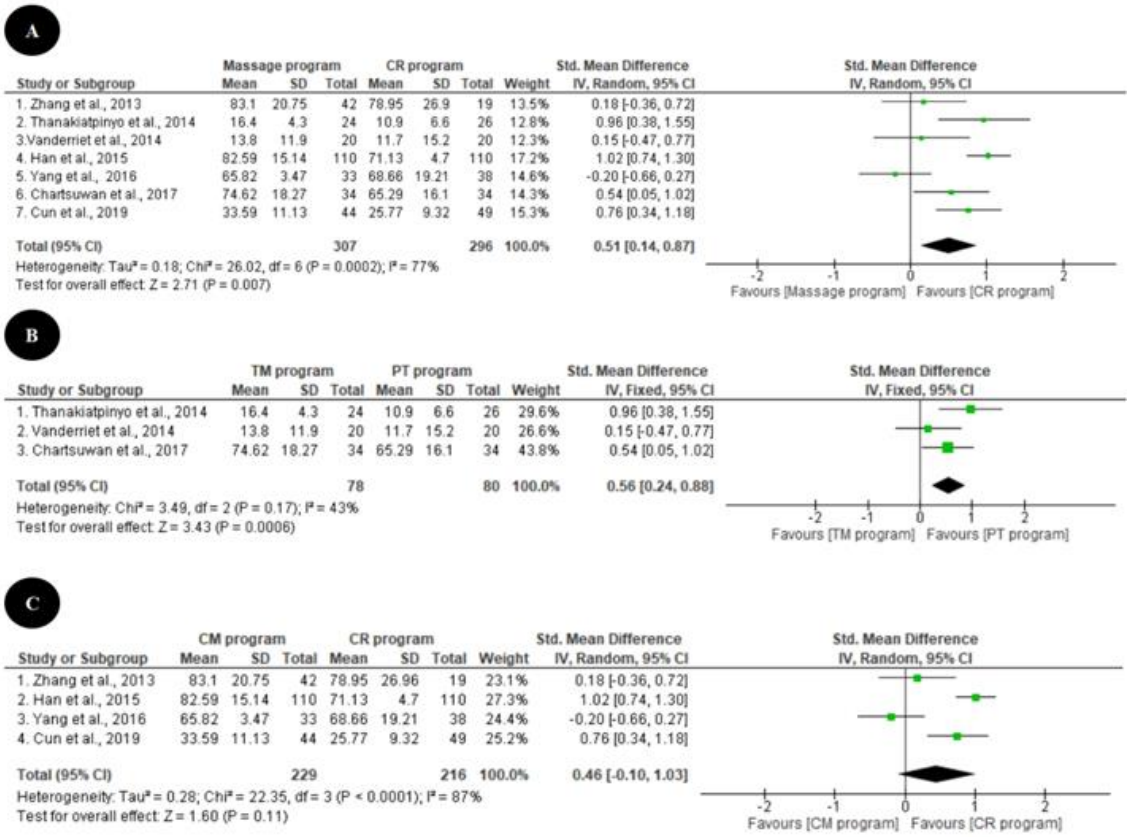

Figure 4: Forrest plot showing the Std. Mean Difference **(A)** of the massaged and non-massaged groups on the scores of the BI, **(B)** of the comparison of the BI scores of the Thai massaged and non-massaged groups, and **(C)** of the comparison of the BI scores of the Chinese massaged and non-massaged groups.

Subgroup Analysis of Thai Massage Therapy

From the analysis results of the ability to perform ADL of stroke patients after receiving Thai massage therapy selected from 3 studies (subgroups analysis), there were 158 samples. There was an asymmetrical funnel plot, as shown in Figure 3B, so this study was prone to publication bias. Nevertheless, the heterogeneity was at the level of "low heterogeneity (25%-49%)" (I^2 = 43%; p <0.001). From the meta-analysis, the Thai massage therapy group had a statistically significant difference in the BI scores from those who did not receive massage therapy. The Std. Mean Difference was 0.56 (95% CI: 0.24-0.88) (Figure 4B).

Subgroup Analysis of Chinese Massage Therapy

From the analysis results of the ability to perform daily activities of stroke patients after receiving Chinese massage therapy selected from 4 studies (subgroups analysis), there were 445 samples. There was an asymmetrical funnel plot, as shown in Figure 3C, so this study was prone to publication bias. Moreover, there was high heterogeneity (75%-100%) (I^2 = 87%; p <0.001). From the meta-analysis, the BI scores of the Chinese massage therapy group were not different from those that did not receive massage therapy. The Std. Mean Difference was 0.46 (95%CI: -0.10-1.03 (Figure 4C).

DISCUSSION

According to the review of the research on the ability to perform the ADL of stroke patients after receiving traditional Thai and Chinese massage therapy, there were seven studies from 2 countries. The study designs were quasi-experimental research and RCTs. The tool used to assess the patients' ability to perform ADL was the BI or the MBI, consisting of 1) feeding, 2) transports, 3) mobility, 4) dressing, 5) bathing, 6) grooming, 7) toilet use, 8) bowels, 9) bladder and 10) stairs. From the meta-analysis, which was divided into the following groups: 1) Thai and Chinese massage therapy, 2) Thai massage therapy, and 3) Chinese massage therapy, it was found that the traditional massage of both countries can increase the ability to perform ADL of patients than those who did not receive massage therapy or modern medicine treatment with statistical significance ($p < 0.05$). This is consistent with the study on the effect of Thai massage in combination with physiotherapy or herbal compress, which can significantly increase the patient's ability to perform ADL. But different from the group receiving only physiotherapy increases blood flow and upper muscle function, resulting in more excellent perception. A study found that physiological effects and biochemical processes at the cell and tissue levels arising from the body's response to systematic massage resulted in more blood flow to the muscles. Because it better increases the ability to eliminate waste products such as lactic acid within the muscles, the acidity in the muscle's decreases. It also increases actin and myosin, resulting in better muscle function [17]. However, a study of Thai massage alone compared with physiotherapy showed that the patients' scores in performing ADL increased in both groups. It may be because the therapy of both groups reduced the patients' muscle spasms. Therefore, it is necessary to increase the number of samples and study the effects of Thai massage over a more extended period [7].

In addition, the literature review and comparing the effectiveness of traditional Chinese massage or Tuina in combination with physiotherapy alone to rehabilitate post-stroke survivors. It was found that Tuina can increase the functional ability of the patients' upper and lower limbs, reduce muscle spasms, improve the ability to carry out ADL and reduce stress, anxiety, and pain [18]. It was also found that Tuina is a Chinese massage that has existed over the past 5,000 years. It is done using fingers and hands to press down on the body's meridians. Its principle is like acupuncture. Studies have shown that Tuina can improve blood and lymph flow by pressing, rolling, pushing, rubbing, shaking, relaxing muscles, moving joints, and reflexology [19-21]. In terms of the mechanism for reducing muscle spasms by Tuina, a study showed that Tuina could stimulate the Golgi tendon organ, which is a sensory organ at the muscle-tendon junction. When the muscles are stretched by massage, it stimulates the Golgi tendon organ. It transmits nerve impulses through the fibers to inhibit the action of the alpha motor neuron, which is responsible for controlling the contraction of muscles. Therefore, this type of massage can reduce muscle spasms in stroke patients [22].

Based on a systematic literature review and meta-analysis in this study, Chinese and Thai massage has tended to increase the ADL of stroke patients, as mentioned earlier. According to research reports, Tuina used to treat stroke patients was as follows: 1) Gun-rolling manipulation, 2) Na-grasping manipulation, 3) Rou-kneading manipulation, and 4) Ca-rubbing manipulation. The massage duration was 15 minutes twice daily [14]. A study by Yang et al. [16] also revealed that the duration and the number of massage sessions were 20 minutes - 25 minutes, once a day, five days a week for four weeks, with a 3-months follow-up. As for the study of Thai massage from meta-analysis, Thai royal and Thai massage, which are different massage methods, were used. The Royal Thai massage only uses the hands to massage and press on the essential body lines and signal

points. As for Thai massage, other organs, such as elbows and knees, can massage, press, roll, squeeze, hold, bend, and pull. An herbal compress was also used for about 30 minutes, two days a week, for six weeks. Each method is appropriate for each symptom and severity of patients [7,12,13]. According to the research on both Thai traditional medicine and Chinese traditional medicine from meta-analysis, it can be concluded that getting massage therapy for 3 weeks - 6 weeks can increase the patient's ability to perform ADL [7,14]. This is consistent with a systematic review and meta-analysis of the efficacy of meridian massage in stroke patients in 16 RCTs and 3 quasi-experimental studies. It was found that meridian massage had an ADL than conventional recovery (MD = 8.87, 95% CI: 4.24-13.49, P <0.001). In addition, when studying the duration of the massage, meridian massage, compared to traditional recovery time of less than 8 weeks, was more effective than massage time of more than 8 weeks. Therefore, the meridian massage of oriental medicine positively affects the patient's ADL and QOL in the short term [23].

There were some limitations. This research selected only the papers published in Thai and English. However, research reports on massage in China are published in the Chinese language. Therefore, the researchers cannot search for them. Consequently, it may result in incomplete information.

CONCLUSION

Based on the literature review and meta-analysis of the effect of oriental massage, namely Thai massage and Chinese massage, on the ability to perform ADL of stroke patients. These two sciences were applied together, emphasizing pressing, rolling, squeezing, gripping, bending, and pulling and herbal compress, which can increase blood flow and reduce muscle spasms. Furthermore, the meta-analysis revealed that the duration of massage that can restore and improve the ability to perform ADL of stroke patients was 3 weeks - 6 weeks. Therefore, this study provides supportive data for Thai and Chinese traditional medicine and multidisciplinary practitioners to apply massage methods, duration, and frequency of massage as an alternative to rehabilitate patients. As a result, patients can carry on their ADL and have a better quality of life.

AUTHORS CONTRIBUTION

Conceptualization, PT, NS; Supervision, NS, SW; Writing-original draft, PT; Writing-review & editing, NS, SW.

CONFLICT OF INTERESTS

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

FUNDING

None.

ETHICAL APPROVAL

Not applicable, because this article does not contain any studies with human or animal subjects.

INFORMED CONSENT

Not applicable, because this article does not contain any studies with human or animal subjects.

TRIAL REGISTRATION

Not applicable, because this article does not contain any clinical trials.

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