

Rehabilitation of stroke patients using traditional Thai massage, herbal treatments and physical therapies

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OBJECTIVE: To determine quantitatively if a unique rehabilitation program using traditional Thai massage, herbal treatments and physical therapies could improve activities of daily living, mood and sleep patterns, and pain intensity of stroke patients over time.

METHODS: This was a prospective cohort study, conducted over a three-month period. Patients were recruited from a 42-bed rehabilitation centre in Northern Thailand, which admits mainly stroke, head injury and spinal patients for rehabilitation.

RESULTS: There were 62 patients enrolled in the study, with 55% being male. The average age of patients was 59 years and 63% were married. The average time since the initial stroke was 15 months. At baseline, the average Barthel Index score was 50.7, and the average emotion, pain and sleep scores were 2.6, 3.1, and 3.2, respectively. After adjusting for age, gender and time since initial stroke in the longitudinal model, the Barthel Index significantly improved by 6.1 points after one month ($P < 0.01$) and by 14.2 points after three months ($P < 0.01$); emotion significantly improved by 0.7 points after one month ($P < 0.01$) and by 0.9 points after three months ($P < 0.01$); pain significantly improved by 0.5 points after one month ($P < 0.01$) and by 0.5 points after three months ($P < 0.01$); sleep significantly improved by 0.5 points after one month ($P < 0.01$) and by 0.6 points after three months ($P < 0.01$).

CONCLUSION: This unique stroke rehabilitation program has produced significant improvements in activities of daily living, mood, pain and sleep patterns of stroke patients. These findings warrant the need for further research to compare patients undergoing this program of rehabilitation with patients undergoing more conventional rehabilitation programs.

KEYWORDS: stroke; rehabilitation nursing; medicine, Oriental traditional; massage; phytotherapy; physical therapy; cohort studies

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Worldwide, stroke is the second leading cause of death^[1] and in Thailand it is the third most common cause of death among Thai people^[2]. The World Health Organisation defines stroke as the sudden development of clinical neurological signs of focal (or global) disturbances of vascular origin, with symptoms lasting 24 h or longer^[3]. Stroke can be classified as either ischemic (involving an interference to blood supply) or haemorrhagic (involving a rupture of a cerebral artery)^[4]. It is an important cause of not only death but disability, with stroke patients suffering significant physical and emotional problems such as motor deficits, cognitive deficits along with pain, depression and sleep disorders^[5]. Stroke also causes immense economic, social and psychological hardship as well as carer distress^[6,7].

In the biomedical model of healthcare, patients who experience an ischaemic stroke receive, in the early phase, anticoagulant treatment involving tissue plasminogen activator^[8]. The aim of this type of treatment is to break up the clot and give the patients a good prognosis preventing long term disability^[6]. The mainstay of treatment for stroke recovery is early ambulation and exercise^[8]. Exercise in hospitals generally takes place in a gym, where patients are supervised and monitored in the use of various gym equipment. Structured programs of exercise involving aerobic exercise have been shown to improved stroke patients mobility and balance^[9,10]. In the gym patients are often placed on a tilt table and wide straps are used to secure them to the table. The aim is for the patient to stand at ninety degrees for a period of time and improve circulation. Hydrotherapy or aqua therapy is frequently used for stroke rehabilitation patients to improve their balance and gait. Noh *et al*'s pilot randomised control trial study^[11] concluded that after hydrotherapy treatments for stroke patients' postural balance and knee flexor strength were improved. However, Mehrholz *et al*'s recent systematic review of four randomised

control trials evaluating the effect of hydrotherapy for stroke patients found that there was insufficient evidence to conclude that water-based exercises did improve activities of daily living, balance and ability to walk^[12].

Complementary and alternative medicine (CAM) therapies are commonly used by stroke patients. A Canadian study used a survey and phone interviews to determine the percentage of stroke patients using CAM and the effectiveness in reducing stroke-related symptoms^[13]. The study found that 26.5% of stroke patients used CAM, with the most common CAMs used being vitamins, massage and acupuncture. However, only 16.1% of these patients found these therapies to be beneficial^[13]. A recent randomised control trial using herbal therapies on stroke patients concluded that it was a useful modality for reducing depression. The trial using herbal therapies (lily bulb, *Rehmannia glutinosa*, and *Slavia miltiorrhiza*) on stroke patients demonstrated that herbal therapies were a viable option for treating depression in this group of patients^[14]. An experimental study into herbal therapies in Korea used Chunpyesagan-tang in the treatment of acute stroke concluded that this oral herbal medication might have improved functional recovery. Chunpyesagan-tang is a popular herbal mixture used in Korea in the very acute phase for stroke patients and is thought to prevent stroke progression, therefore reducing the risk of neurological disability^[15].

A randomised control trial conducted in Korea involving aromatherapy and acupressure on stroke patients concluded that aromatherapy and acupressure improved shoulder pain more than acupressure on its own^[16]. Another recent Korean study involving meridian acupressure for stroke patients demonstrated an improvement in upper limb function, along with increased activities of daily living (ADL) and reduced depression in stroke patients^[17]. The results for acupuncture from two studies show positive outcomes for stroke patients, using the

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Barthel Index of ADL^[18,19]. However, a randomised control trial on acupuncture showed no difference in the Bartel Index or the neurological scores between the groups^[20]. A Hong Kong study demonstrated that slow back massage reduced anxiety and pain for elderly stroke patients in a Hong Kong rehabilitation centre^[21]. A United Kingdom study employed a type of massage called Marma therapy, involving vigorous pressure along the affected side. Results of this pilot non-randomised controlled trial did not show evidence on the efficacy of this therapy^[22]. Foot massage involving reflexology is another form of massage that involves pressure points on the feet which correlate to specific parts of the body and enhance homeostasis stimulating the reflex zone of internal organs in the body^[23]. There are numerous benefits reported, such as relaxation and relief of pain. It is thought to free a blockage and increase the energy flow by getting rid of the accumulating lactic acid so as to improve circulation^[24]. Results from a quantitative study in Korea involving stroke patients suggest that foot reflexology is an effective modality that helps the body work efficiently and eases stress and strain^[25]. A systematic review of the literature on CAM treating communication disorders (including not just stroke patients but also dementia and traumatic brain-injured patients) reported little scientific evidence on the effectiveness of CAM^[25].

Traditional medicines and therapies are a common healthcare choice made by Thai people^[26]. Some of the traditional medicines or therapies used include Thai massage, herbal compresses, herbal baths and foot massage. Thai massage, also known as Nuad Bo Rarn, involves deep massage and passive stretching on the affected muscles. During the massage, which involves brief sustained pressure, the practitioner uses thumbs, elbows, palms and feet to control the mechanical pressure applied during massage. The massage directly presses on the meridian lines called "Sen Sib", focusing the pressure on specific points on these lines^[27]. Numerous benefits of Thai massage have been identified in the literature including reduction of heart rate and blood pressure, reduction in stress, increased blood supply to organs, increased flexibility, relief of stress, anxiety and depression and improved immunity^[28-31]. The use of hot herbal compresses, called *luk pra kob*, are often made up of a variety of herbs involving *plai* (*Zingiber cassumunar* rhizome), turmeric, lemongrass, kaffir-lime peel, salt, and camphor. The herbal compresses are typically bundled together in muslin to make a round ball shape, steamed and then applied to the person's body with pressing and circular movements. The herbal compresses are commonly used to relieve pain and inflammation^[26]. Other benefits include relief of stress and a sense of wellbeing^[32]. The therapeutic use of herbal baths has also been used as part of traditional healing practices in

Thailand^[26]. A combination of herbs is placed in the bath and patients then soak in the bath. The benefits of this therapy include stimulation of the circulation and relief of muscle tension and pain^[26].

A qualitative study on Thai stroke patients found that some patients complained that the Thai massage treatments were quite painful. Further, the younger patients preferred to exercise in the gym rather than receive massage and the herbal treatments^[33]. However, interviews with the treating nurses reported that there were considerable improvements in sleep, mood and pain within two weeks of patients' admission, as well as an improvement in ADL particularly in walking, and there was less pain from muscle spasm and stiffness, patients slept better, and their mood improved^[34].

Given this positive, anecdotal qualitative evidence, this current study was undertaken to examine quantitatively the effects that this unique treatment had on the stroke patients. Specifically, this study aimed to determine if a unique rehabilitation program for stroke patients involving Thai massage, herbal therapies and physical activities improved ADL, mood and sleep patterns, and pain intensity.

1 Materials and methods

1.1 Setting The setting was a 42-bed rehabilitation centre in Northern Thailand (Thung Bo Paen Rehabilitation Centre) that admits mainly stroke, head injury and spinal patients for rehabilitation. The centre was formally established in 1994 by a Buddhist Master Monk called the Abbott who studied herbal medicine and applied his knowledge of herbs in treating his mother who had suffered stroke. The centre is a private centre that received formal approval from the Federal Government of Thailand in 2007. Both in-patients and out-patients are treated at the centre. Local people are paid employees and trained to work as rehabilitation therapists. The carers assist patients in ADL. They also help with the preparation of herbal therapies and assist rehabilitation therapists to massage patients. Carers are usually family members, however they may also be hired carers. All the nurses, including the head nurse, are volunteers and work 6 h shifts at the centre. There is also one part-time physical therapist and a physician from Hang Chat Hospital (the community hospital) who visits the patients once a month. The centre only admits patients who are not in critical conditions. However, if there are any critical health issues of patients, physicians from the Hang Chat Hospital are available for consultation and referral, as well as the Lampang Hospital (provincial hospital). This research project was approved by the University of Newcastle Ethics Committee (NSW, Australia).

1.2 Samples The inclusion criterion was all new patients over the age of 18 years, admitted to the

rehabilitation centre during the study period. The exclusion criteria included: patients who did not wish to participate; patients with head or spinal cord injuries; patients with cognitive impairment, for example, confused patients or patients with dementia. All new patients admitted to the rehabilitation centre during the study period, who met the inclusion criterion, were approached. Nurses asked these patients if they were willing to participate in this research. The head nurse then notified the researchers about potential participants.

1.3 Treatments Patients at the centre were taken through a daily procedure of the following order. Firstly, to relieve bruising, swelling and pain, a hot compression was applied using a heated crinum lily leaf to the whole body, then specific areas that were weak and painful such as the legs and arms were worked on. This step typically lasted for approximately 30 min. Then, another hot compress was applied to the legs using various herbs, in the form of a herbal compression ball, to relax the muscles and to improve muscle mobility. This compression ball was composed of Plai (*Zingiber cassumunar* Roxb.), lemon grass and kaffir lime. The compression ball was steamed and dipped in alcohol before being applied to the patients. The therapist did this procedure for 30 min. To determine if the temperature of the compression was at a safe level, therapists had to test the herbal ball on their own skin prior to conducting compression on the patient's skin. During compression application, therapists needed to assess skin appearance and continually ask the patient, if they are comfortable with the compression. To improve muscle rehabilitation, patients were then taken through a regime of Thai massage and passive range and motion of joints. Patients were then soaked in a warm herbal bath of kaffir lime and lemon grass for 5 to 10 min to reduce muscle tension and improve circulation. Following this, they also exercised in the gym where they worked on a variety of exercise equipment to strengthen muscle power in their arms and legs. Patients spent about 20 to 30 min on each piece of equipment. Equipment includes hand-shoulder wheel, parallel bars, an adjustable tilt table, a corner-style staircase, and a stationary bicycle. Patients could also sit in a chair and have their feet massaged by a machine for 20 min, which works on reflexology points. Finally, patients walked through a mud pit designed to improve their gait. The mud pit is 1 m wide, 60 cm deep, and 10 m in length. Walking through the mud improves patients' muscle tone and joints. It also helps corrects their deviated gait preventing the leg from kicking outwards while walking. Normally, the patients did this walk for 20 min, two to three times a week. Patients received this treatment program on a daily basis. All patients received the same sequence of all treatments. All the treatment

techniques were accepted as clinical care.

Note that herbal baths are contraindicated in patients with heart disease. Herbal compresses are not suitable for patients with gout, rheumatism, arthritis or allergies, so these patients were excluded from this type of treatment. Patients with broken skin or lesions on their legs were not taken through the mud pit.

1.4 Measures ADL were assessed using the Barthel Index, which is scored on a scale from 0 to 100, based on 10 items describing ADL and mobility^[35]. The higher the score the more "independent" the person is. The Barthel Index was completed via observations made by the nurses. Completion of the Barthel Index is part of routine nursing care. Mood, pain and sleep patterns were assessed using a 10-point visual analogue scale (VAS)^[36]. Each of these scales was represented by a line with markings from 0 to 10. On the pain scale the words "worst pain" were written at the lower end and the words "no pain" at the upper end. On the mood scale the word "sad" was written at the lower end and the word "happy" at the upper end. On the sleep pattern scale, the word "sleepless" was written at the lower end and the words "good sleep" at the upper end.

1.5 Statistical analyses Student *t*-tests were used to make unadjusted comparisons between baseline and follow-up scores for each outcome measure. Longitudinal analyses were conducted using generalized linear mixed models (GLMMs)^[37], adjusting for age, gender and time since the initial stroke. A GLMM is an extension to generalised linear models, which accounts for the correlated data arising from repeated measures on individuals over time. GLMMs account for the correlated data by allowing regression coefficients to differ between subjects, for example, random coefficients. All analyses were conducted using the statistical software STATA 11.

2 Results

2.1 Inclusion and exclusion Figure 1 shows the flow diagram of the patient numbers at each stage of the study. There were 100 patients assessed for eligibility, with 38 meeting the exclusion criteria, leaving 62 patients in the study. At one month follow-up there were still 62 patients, at three months follow-up there were only 19 patients remaining. In comparing the 19 patients who remained in the study with the 43 patients who did not, there was no statistically significant difference in age ($P=0.653$) or time since the initial stroke ($P=0.217$), but a greater percentage of females (68%) remained in the study ($P=0.014$). The main reasons for the dropouts were recovery and consequent discharge from the centre ($n=33$), patient condition deteriorated such as too high a blood pressure, infection and depression ($n=6$), or no relative or carer ($n=4$).

2.2 Demographics Of the 62 patients recruited

into the study, 45% were female. The average age of the patients was (59.6 ± 11.1) years; the youngest aged 22 and the oldest aged 88 years. The average time since initial stroke was (15.0 ± 2.1) months; the minimum time being one week (four patients) and the longest time 84 months.

2.3 Change in health status over time Table 1 shows the average Barthel, emotion, pain and sleep scores for the patients at each time period. The unadjusted analyses show that there was statistically significant improvement from baseline to both follow-up periods for all outcome measures. Results from the longitudinal modelling show that the Barthel Index scores significantly improved by 6.1 points after one month ($P < 0.01$) and by 12.4 points after three months ($P < 0.01$). A change in Barthel Index scores of 1.85 points or

more is considered to represent a clinically significant change for stroke patients^[35]. Emotion scores significantly improved by 0.7 points after one month ($P < 0.01$) and by 1.1 points after three months ($P < 0.01$). A change in emotion scores of 1.0 points or more is considered to represent a clinically significant change^[38]. Pain scores significantly improved by 0.5 points after one month ($P < 0.01$) and by 0.6 points after three months ($P < 0.01$). A change in emotion scores of 0.9 points or more is considered to represent a clinically significant change^[39]. Sleep scores significantly improved by 0.5 points after one month ($P < 0.01$) and by 0.6 points after three months ($P < 0.01$). A change in sleep scores of 1.0 points or more is considered to represent a clinically significant change^[40].

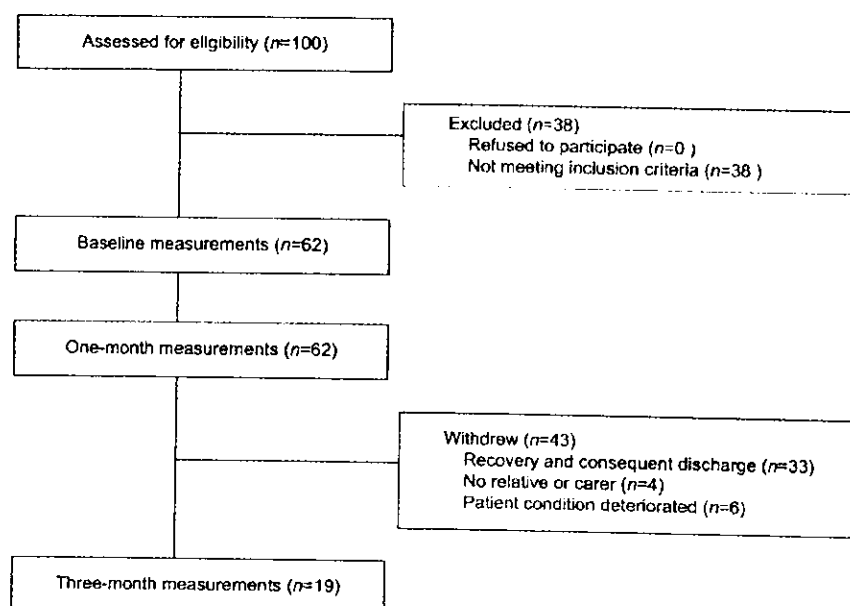


Figure 1 Patient flow diagram

Table 1 The average Barthel Index, emotion, pain and sleep scores for the patients at each time point

(Mean $\pm$ standard deviation, scores)					
Time point	n	Barthel Index	Emotion	Pain	Sleep
Baseline	62	50.7 $\pm$ 21.9	2.6 $\pm$ 1.0	3.1 $\pm$ 0.9	3.2 $\pm$ 0.9
After one month	62	56.1 $\pm$ 21.0 **	3.3 $\pm$ 1.0 **	3.6 $\pm$ 0.5 **	3.7 $\pm$ 0.6 **
After three months	19	62.4 $\pm$ 20.7 **	3.7 $\pm$ 0.6 **	3.7 $\pm$ 0.6 **	3.8 $\pm$ 0.6 **

** $P < 0.01$, vs baseline.

3 Discussion

This unique stroke rehabilitation program has produced significant improvements in ADL, mood, pain and sleep patterns. Studies using similar interventions have reported mixed findings across these measures of health status. The ADL benefits found in our study are not supported by literature on stroke patient interventions. A systematic review found that there was insufficient evidence to conclude that water-based exercises improved ADL, using several outcome measures, including

the Barthel Index^[12]. While Marma therapy also did not show evidence on the efficacy of this therapy in terms of ADL, again using the Barthel Index^[22]. However, a randomised control trial examining the effects of aromatherapy and acupuncture reported that both therapies showed an improvement in motor function^[16]. This study did not use the Barthel Index as an outcome measure, instead used an individual level of motor power assessment with the classification of the American Academy of Physical Medicine and Rehabilitation. A study assessing the safety and efficacy of the herbal

formulation Chunpyesagan-tang used a modified Barthel Index to assess ADL and concluded that this herbal therapy may have improved patient functional recovery^[15]. The divergent results presented in the literature may suggest that some components of the program offered at the Thung Bo Paen Rehabilitation Centre are of greater benefit than other components or that some or all components are required in conjunction to achieve the greater benefit to patients.

In terms of mental health benefits, the findings from our study were supported in the literature. A randomised control trial using oral/ingested herbal therapies (including lily bulb) on stroke patients demonstrated that herbal therapies were effective in treating depression in this group of patients^[14]. While another study showed that slow back massage reduced anxiety for elderly stroke patients, using the Stait Trait Anxiety Inventory^[21]. A study on Korean stroke patients suggested that foot reflexology was effective in easing stress^[23]. However, another study reported that only a minority of Canadian stroke patients found that CAM treatments (including massage) made them feel better^[13].

Studies have demonstrated pain relief in stroke patients using a variety of CAM. Slow back massage was shown to reduce pain for elderly stroke patients^[21], while herbal compresses and herbal baths were shown to be beneficial to pain relief^[26]. Combined aromatherapy and acupressure for stroke patients suffering hemiplegic shoulder pain was reported to be more effective in reducing their pain, compared to acupressure on its own^[16]. A study on elderly stroke patients demonstrated that massage helped improve sleep, as judged via an open-ended questionnaire assessing patients' perceptions of the massage^[21].

The interpretation of our findings may be limited by the fact that there was no control group of patients to enable comparisons to be made between this program of traditional Thai therapies and more conventional treatments. Without a control group we are unable to determine if our results are due to the treatment or if there are elements of spontaneous recovery following stroke. Although there were no statistically significant differences between those who completed the three months of treatment and those who did not on a several key measures, there was considerable loss to follow-up at the third months. Therefore, findings should be interpreted with caution. Further, for this study nurses assisted patients with the VAS scoring by asking the questions and then completing the VAS according to what the patients pointed to on the scale or told them how they felt, thus potentially introducing biases.

In conclusion, this study suggests that the use of multimodal treatment regimens involving traditional Thai massage, herbal treatments and physical

therapies could be translated into Western clinical practice to improve rehabilitation of stroke patients. However, there is a need for further research to compare this program with more conventional treatments in a clinical trial or case-control setting, to determine if the program is superior to conventional treatments. There is also a need to tease out which aspects of the program produce what kind of benefits.

4 Competing interests

The authors declare that they have no competing interests.

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传统泰式按摩、草药和物理疗法对脑卒中患者的康复治疗作用

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目的:研究包含传统泰式按摩、草药以及物理疗法的康复治疗方是否能够改善脑卒中患者的日常活动能力、情绪、睡眠质量以及疼痛程度。

方法:本研究的设计为前瞻性队列研究,研究周期为 3 个月。患者来自泰国北部一家有 42 张床位的康复中心,该中心主要针对脑卒中、头部创伤和脊柱病患者进行康复治疗。

结果:本研究共纳入脑卒中患者 62 人,55% 为男性。患者平均年龄 59 岁,其中 63% 为已婚,首次卒中时间平均为 15 个月。在基线水平,巴氏量表平均指数为 50.7,情绪、疼痛及睡眠平均指数分别为 2.6、3.1、3.2。在进行年龄、性别和首次卒中时间的纵向模型评估 1 个月后,巴氏量表指数、情绪、疼痛和睡眠指数均显著提高,分别上升了 6.1、0.7、0.5、0.5 分(均 $P < 0.01$);3 个月后,各指数分别提高了 14.2、0.9、0.5、0.6 分(均 $P < 0.01$)。

结论:该康复治疗方能够明显改善患者的日常生活、情绪、睡眠质量以及疼痛程度。我们还需要进一步比较接受该康复治疗方和接受常规康复治疗方的患者来支持这一结论。

关键词:卒中; 康复护理; 医学, 东方传统; 按摩; 植物药疗法; 物理疗法; 队列研究