

Non-Traditional Chinese and non-Ayurvedic complementary and alternative medicine in Southeast Asian post-stroke care: A systematic review

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Abstract

Background and Purpose: Stroke has a particularly high incidence and mortality in the Association of Southeast Asian Nations (ASEAN) region. Complementary and alternative medicine (CAM) usage is widespread in this region, including Traditional Chinese Medicine (TCM) and Ayurvedic medicine, but also other forms of traditional medicine. This study aims to systematically review the prevalence, type and effectiveness of non-TCM non-Ayurvedic CAM in post-stroke patients in the ASEAN region.

Methods: PubMed, Embase and Scopus databases were searched from inception to 27 July 2024. Studies with patients from the ASEAN region who were diagnosed with stroke and used any CAM that was not TCM or Ayurvedic medicine were included. Two independent authors screened through relevant articles, extracted data and assessed risk of bias. **Results:** Sixteen studies from four countries were included. The use of massages, herbs, spiritual and energy healing methods were widely adopted for post-stroke patients in the ASEAN region. Evidence for CAM improving neurological and physical stroke outcomes were limited. Despite this, studies have been largely unanimous in reporting improved psychological and quality of life outcomes following CAM use.

Conclusions: There is a severe paucity of published literature on non-TCM and non-Ayurvedic CAM use in stroke patients in the ASEAN region despite likely widespread use. There is some evidence of potential benefit but these are limited to subjective patient-reported outcomes. More research is needed to understand its impact and how best to complement conventional stroke care without compromising outcomes.

Keywords: Stroke, complementary and alternative medicine, traditional medicine, Southeast Asia, ASEAN region

INTRODUCTION

The Association of Southeast Asian Nations (ASEAN) region consists of 11 countries: Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, Thailand, Timor-Leste, and Vietnam, and has a population of over 670 million.^{1,2} This region has a particularly high incidence of stroke³, likely contributed by uncontrolled hypertension, extremely high smoking rates, evolving patterns of diet and exercise as well as pollution and urbanisation.⁴

The ASEAN region accounts for over 40% of global stroke mortality.⁵ By the year 2050, stroke is expected to be the main contributor of age-standardised mortality in this region.⁶

Complementary and Alternative Medicine (CAM) are a group of diverse medical and healthcare practices and products that are not currently considered to be a part of conventional medicine.⁷ In stroke, studies have described CAM usage through a variety of modalities, targeting different aspects of disease: as adjuncts to preventatives, conventional therapies, or in

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Date of Submission: 9 January 2025; Date of Acceptance: 2 April 2025

<https://doi.org/10.54029/2025mua>

secondary prevention efforts and enhancers of rehabilitation.^{8,9} A mainstay of CAM, Traditional Chinese Medicine (TCM) and Ayurvedic medicines have been widely adopted in post-stroke treatment.^{10,11} A recent review of randomised control trials and meta-analyses comparing the combined usage of TCM with routine Western medicine to Western medicine alone in post-stroke therapy found that the addition of TCM improved neurological recovery.¹² Ayurvedic medicine has also shown potential to improve neurological functional outcomes in stroke.^{13,14}

However, there lies a gap in existing knowledge between well-elucidated TCM and Ayurvedic medicine when compared against their non-TCM non-Ayurvedic counterparts in stroke care. This oversight is especially apparent in the ASEAN region which boasts centuries of diverse forms of CAM for a variety of conditions, at times the only source of care available for certain communities.¹⁵ The current and expected burden of stroke, together with the region's widespread use of CAM emphasises the role of a consolidation on current knowledge of CAM use in rehabilitation and recovery post-stroke. This paper aims to review the prevalence, various subtypes and effectiveness of non-TCM, non-Ayurvedic CAM in post-stroke patients in the ASEAN region.

METHODS

The protocol of this study was registered on PROSPERO (ID: CRD42024578432) and was performed with reference to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines.¹⁶

Search strategy

PubMed, Embase and Scopus databases were searched from inception to 27 July 2024. Search terms related to CAM, Southeast Asia and stroke were used. Articles from 11 countries: Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, Thailand, Timor-Leste, and Vietnam were identified. The bibliographies of included articles were further searched for potential missing studies but no further studies were found. The full search strategy can be found in Supplementary Table 1.

Study selection

The titles and abstracts of the articles identified through searching of the databases were screened by two independent authors (TMSR, JJ).

Afterwards, these authors screened the full texts of shortlisted articles for inclusion. Disputes in the decisions were resolved through the consensus of a third independent author (RSHW).

Case reports, case series, cross sectional studies, cohort studies, case control studies, qualitative studies, mixed method studies, randomised controlled trials and nonrandomised trials were included. Meta-analyses, reviews, paediatric studies, conference proceedings, abstracts, letters, in-vivo studies, animal studies and studies published in languages other than English were excluded. The inclusion criteria were designed according to the Population, Intervention, Comparators, Outcomes (PICO) framework. Studies with adults from Southeast Asia who were diagnosed with stroke who used any CAM used in Southeast Asia that was non-TCM and non-Ayurvedic were included.

Data extraction

Data from the included articles were extracted by two independent authors (TMSR, JJ) using a fixed template. Any disputes in extraction were resolved through the consensus of a third independent author (RSHW).

Risk of bias assessment

The risk of bias of the included studies was assessed by two independent authors (TMSR, JJ) using the Mixed Methods Appraisal Tool (MMAT).¹⁷ Disagreements in assessments were resolved by a third independent author (RSHW). The MMAT is intended to be used in appraising reviews containing qualitative, quantitative and mixed methods studies. This tool allows for the assessment of risk in 5 study types: qualitative, quantitative non-randomized, quantitative descriptive and mixed methods. This assessment consists of questions about the studies' methodologies, results, analyses and conclusions.

RESULTS

Literature search

The PRISMA flowchart delineating the process of the study selection is shown in Figure 1. The initial search of three databases retrieved 1792 results of which 363 duplicates were removed. The titles and abstracts of 1429 articles were screened, and 42 articles were sought for full text review. During full text screening, one article was unable to be retrieved. Finally, 16 studies were included in the systematic review.¹⁸⁻³³

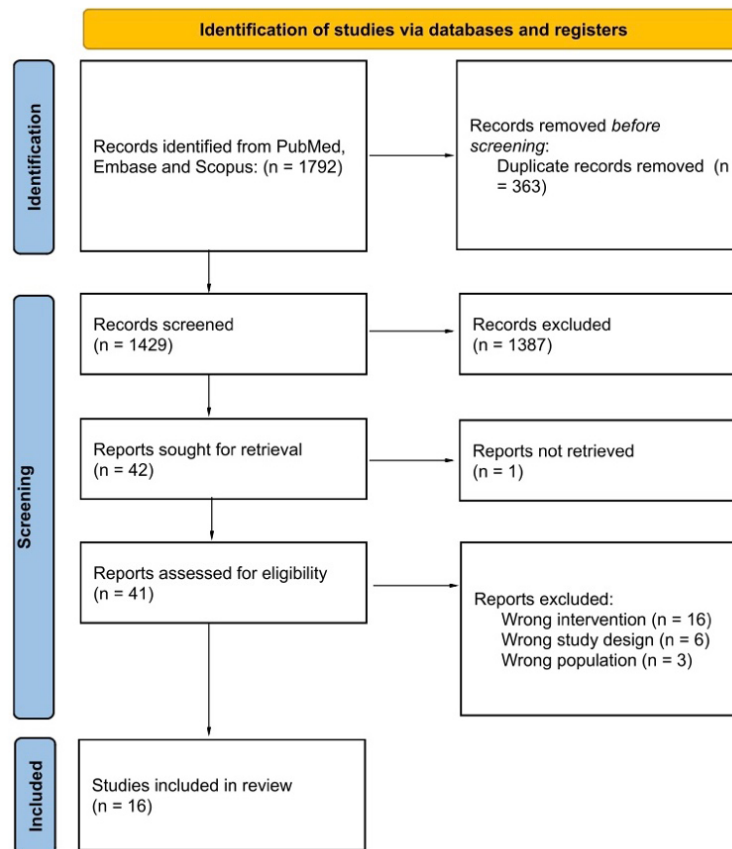


Figure 1. PRISMA flowchart of included studies

Characteristics of included studies

A summary of the study characteristics and the main findings of the included studies can be found in Tables 1 and 2. Of the 16 studies included in the systematic review, six were from Thailand^{22,24,30–33}, five were from Malaysia^{18–20,23,26}, four were from Indonesia^{21,27–29}, and one was from Singapore.²⁵ A pictorial representation of included studies' respective countries of origin is depicted in Figure 2. There were seven qualitative studies^{19,22,26–28,32,33}, three cross-sectional studies^{18,25,29}, two cohort studies^{23,24,30,31}, two randomised controlled trials^{24,31}, one quasi experiment^{20,21}, and one case report.²⁰ After assessment of the studies using the MMAT it was determined that all but one study had a score of 3 or more, out of 5. The appraisement of the studies using MMAT can be found in Supplementary Table 2.

Thailand

Out of the six studies from Thailand describing the use of CAM post-stroke^{22,24,30–33}, five described

traditional Thai massages. The traditional Thai massage, also called *Nuad Thai*, is not only one of the most popular alternative therapies in Thailand but also an essential part of Thai culture recognised in the United Nations Educational, Scientific and Cultural Organization (UNESCO) Intangible Cultural Heritage list.³⁴ This massage targets ten major energy channels in the body called *Sen Sib* to unblock obstructions in energy flow through deep massages, serving to improve one's health and awareness. Two of these studies, Kamalashiran *et al.*²⁴ and Thanakiatpinyo *et al.*³¹ were randomised controlled trials. Kamalashiran *et al.*²⁴ investigated the benefits of a massage protocol developed specifically for the treatment of acute ischaemic stroke on top of conventional physical therapy, with 16 participants in the intervention and 17 in the control group. The addition of traditional Thai massage did not show significant additional benefits in Barthel Index, quality of life, modified Rankin scale, or motor power at the end of 20 days, nor did it show any adverse effects. Thanakiatpinyo *et al.*³¹ compared 24 participants who received traditional Thai

Table 1: Characteristics of included studies

Author	Year	Study Location	Study Design	Study Setting	Participant Selection	Pertinent Participant Information	Diagnosis, Diagnostic Procedure
Ali <i>et al.</i> ¹⁸	2015	Malaysia	Cross-sectional study	Medical Rehabilitation Services Department, Universiti Kebangsaan Malaysia Medical Centre	Post stroke patients attending an outpatient rehabilitation program	104 stroke patients	Ischemic and non-ischemic stroke, Not specified
Anuar <i>et al.</i> ¹⁹	2012	Malaysia	Qualitative study	Traditional and complementary medicine unit in one of the integrated hospitals	Poststroke patients as well as their urut Melayu practitioners	17 poststroke patients undergoing urut Melayu treatment and 2 urut Melayu practitioners	Stroke, Not specified
Fadzil <i>et al.</i> ²⁰	2012	Malaysia	Case report	Traditional and complementary medicine unit	Patient with a postpartum stroke	1 thirty-two year-old woman	Dense stroke to the right side of the body due to hypoxic ischemic encephalopathy, Not specified
Farhana <i>et al.</i> ²¹	2016	Indonesia	Quasi-experiment	Dr. Sardjito General Hospital and Wates Regional Hospital, Yogyakarta	Admitted ischemic stroke patients	48 stroke patients	Ischaemic stroke, Head computed tomography scan
Jullamate <i>et al.</i> ²²	2006	Thailand	Qualitative study	Registry department of the Queen Sawangwatthana Memorial Hospital in Chonburi province	Informal caregivers of stroke survivors	Caregivers of 20 stroke patients	Stroke, Not specified
Kadir <i>et al.</i> ²³	2015	Malaysia	Prospective cohort study	Medical wards of a tertiary hospital (Hospital Raja Perempuan Zainab II) in the northeast region of Peninsular Malaysia	Patients with acute stroke admitted to the medical wards	93 stroke patients	Stroke, Clinical symptoms and/or signs
Kamalahshiran <i>et al.</i> ²⁴	2024	Thailand	Randomised controlled trial	Chaophya Abhaibhubejhr Hospital	Admitted patients with ischemic stroke	33 stroke patients	Ischemic stroke, Clinical assessment
Lee <i>et al.</i> ²⁵	2004	Singapore	Cross-sectional study	Two medical centres (Singapore Health Services Polyclinics)	Singaporean citizens or permanent residents above 21 years of age who have been treated in the past year for one or more of: asthma, chronic obstructive pulmonary disease, diabetes mellitus, hypertension, dyslipidaemia, coronary artery disease, cardiac failure, cardiac arrhythmias, stroke, arthritis, gout and other musculoskeletal conditions	31 stroke patients out of 488 patients with chronic conditions	Stroke, Not specified

Mairami <i>et al.</i> ²⁶	2020	Malaysia	Qualitative study	Households from Rural Peninsular Malaysia	Individuals who have ever experienced a stroke, could communicate personally or with the aid of a caregiver, and could provide informed consent	27 stroke patients	Stroke, By a household census identifying individuals who have ever fulfilled $\geq 2/4$ of the World Health Organisation's "Face, Arms, Speech, Time" criteria, followed by clinical evaluation by a medical doctor based on history and physical examination
Norris <i>et al.</i> ^(a) ²⁷	2010	Indonesia	Qualitative study	Central Aceh, a rural area in Indonesia	Participants were identified from an international disability organisation based in the region	11 stroke patients	Stroke, Not specified
Norris <i>et al.</i> ^(b) ²⁸	2011	Indonesia	Qualitative study	Aceh, a rural area in Indonesia	Not described	29 stroke survivors and their carers 14 biomedical practitioners 8 non-biomedical practitioners	Stroke, Not specified
Pradipta <i>et al.</i> ²⁹	2023	Indonesia	Cross-sectional	From the Indonesian Family Life Survey 5 database, where 75,000 populations over 27 Indonesian provinces and 83% of the populations is represented	Chronic disease patients undergoing any type of treatment, excluding those with incomplete data	4,901 subjects, 224 with stroke	Stroke, Self-reported based on participants knowledge of chronic disease and treatment
Sibbritt <i>et al.</i> ³⁰	2012	Thailand	Prospective cohort study	A 42-bed private rehabilitation centre in Northern Thailand treating both in-patients and outpatients.	All new stroke patients over the age of 18 years admitted to the centre during the study criteria, excluding those with cognitive impairments	62 stroke patients	Stroke, Not specified
Thanakiatpinyo <i>et al.</i> ³¹	2014	Thailand	Randomized controlled trial	Outpatient unit of the Department of Rehabilitation Medicine, Faculty of Medicine Siriraj Hospital in Bangkok, Thailand	Chronic stroke (≥ 3 months) patients with moderate-to-severe spasticity of the elbow or knee in at least one limb ($\geq 1+$) as evaluated by the Modified Ashworth Scale, aged ≥ 50 and able to communicate	50, 24 receiving traditional Thai massage and 26 receiving conventional physical therapy	Stroke, Not specified
van der Riet <i>et al.</i> ^(a) ³²	2012	Thailand	Qualitative study	A 42-bed private rehabilitation centre in Northern Thailand treating both in-patients and outpatients.	Not described	6 volunteer nurses of stroke patients	Stroke, Not specified
van der Riet <i>et al.</i> ^(b) ³³	2012	Thailand	Qualitative study	A 42-bed private rehabilitation centre in Northern Thailand treating both in-patients and outpatients.	Not described	6 inpatients with stroke	Stroke, Not specified

Table 2: Interventions and main findings of included studies

Author	Aim of Study	Assessment Procedures, Outcome Measures	Intervention	Control	Main Findings	MMAT Score (/5)
Ali <i>et al.</i> ¹⁸	To determine the prevalence, practice and perception of traditional and complementary medicine use among stroke survivors attending an outpatient rehabilitation program	Self-administered questionnaire	Manipulative and body-based practices, biological and organic based therapy, mind-body medicines and whole medical system	Not applicable	69 out of 104 patients used traditional and complementary medicine concurrently while attending conventional stroke rehabilitation. The frequency of use of mind body medicine was 6.7%, biological based was 9.6%, homeopathy was 1.0%, manipulative and body based therapy was 43.3%.	4
Anuar <i>et al.</i> ¹⁹	To gain an insight into the experiences and views of poststroke patients and their urut Melayu practitioners.	Semi-structured interviews	Urut Melayu	Not applicable	16 patients reported notable improvement following urut Melayu. There were improvements in activities of daily living as well as physical and psychological domains.	5
Fadzil <i>et al.</i> ²⁰	To describe the improvement of a patient following postpartum stroke after treatment with urut Melayu	Not applicable	Urut Melayu	Not applicable	The patient had functional improvement such as in walking, sitting, holding her child, speaking, bathing, and toileting. Her mood, sleep and appetite also showed improvement.	5
Farhana <i>et al.</i> ²¹	To determine the effectiveness of Gotu Kola (<i>Centella asiatica</i>) in improving cognitive function in patients with vascular cognitive impairment	Montreal Cognitive Assessment-Indonesian version (MoCA-Ind), cognitive domains and side effects	Gotu Kola extract therapy 1000mg and 750mg	Folic acid 3mg	All treatment groups showed significant improvement in MoCA-Inda score after six weeks with the most significant increase found in the Gotu Kola 1000 mg/day treatment group (5.6 ± 4.61). However, not one therapy was statistically more effective than the others. There was no significant difference between treatment groups for all domains tested, except for memory domain (delayed recall memory) which showed statistically more significant improvement in patients treated with Gotu Kola compared with patients treated with folic acid ($p<0.001$).	5
Jullamate <i>et al.</i> ²²	To describe the characteristics of Thai stroke caregivers and to explore their needs while providing care to their stroke relatives.	Interviews	Traditional Thai treatments as well as traditional herbs and medicines, including local home-made rehabilitation instruments	Not applicable	Description of local Buddhist monks and stroke caregivers providing the intervention.	5

Kadir <i>et al.</i> ²³	To assess the pattern of complementary and alternative medicine (CAM) use and its associated factors among stroke survivors in a tertiary centre in Malaysia.	Clinical assessment and interviews	CAM was defined as the use of any medical or non-medical therapy that was different from allopathic medicine within 6 months of the study period with the intention of curing stroke	Nonuser of CAM	66.7% used CAM, with 36.6% using massage, 5 97.8% using herbal therapies, 86% using vitamins, 91% using traditional healers and 3.2% using other types of unspecified CAM.
Kamalashiran <i>et al.</i> ²⁴	To assess the feasibility and safety of combining traditional Thai massage steps with physical therapy in treating acute ischemic stroke compared to physical therapy alone	Barthel index, National Institutes of Health Stroke Scale (NIHSS), Stroke Specific Quality of Life (SS-QOL), motor power of upper and lower extremities	Traditional Thai massage and physical therapy	Physical therapy	Despite both groups improving in the outcome measures, there were no statistically significant differences in Barthel index scores, NIHSS scores, SS-QOL scores, and the motor power of upper and lower extremities between the two groups.
Lee <i>et al.</i> ²⁵	To determine the prevalence of CAM use and its clinical and psycho-social correlates, including perceived satisfaction with care and cultural health beliefs.	Questionnaire	CAM	Not applicable	13 out of 31 stroke patients used CAM, with 5 6 patients using non-Traditional Chinese Medicine (TCM) and non-acupuncture forms of CAM.
Mairami <i>et al.</i> ²⁶	To explore the contextual factors that mediate recovery following stroke in Malaysia, a middle-income country, from the perspective of stroke survivors	Semi-structured interviews together with field-notes documenting non-verbal responses and surrounding environment, as well as input by caregivers. Participants discussed experience of stroke, coping mechanism, views of health care, and interventions received	Massage, herbs, Islamic medicine (as well as TCM, acupuncture)	Not applicable	All participants had tried one or a combination 5 of traditional therapies, with most reporting improvements in their condition and believing that it aided considerably in their recovery. A few claimed no benefit. Some lauded the use of traditional massages daily, reporting return to mobility and curing mouth deformity.
Norris <i>et al.</i> (a) ²⁷	To explore the lay understanding of stroke in Central Aceh, Indonesia. Specific objectives included: to explore the understanding and perception of stroke in rural Central Aceh; and to identify the mediating factors in that understanding.	Interviews, photographic facilitated interviews and participant observation to explore the understanding and perception of stroke in rural Central Aceh, and to identify the mediating factors in that understanding	Massage, acupressure, "conversation with the spirit", an internal massage called totok, cupping procedure called bekam	Not applicable	The understanding behind the CAM used is 5 based on a belief that blood is not flowing well, or blood is not clear - so massages, acupuncture can physically clear the blockage. Cupping is also thought to suck dirty blood from the body.
Norris <i>et al.</i> (b) ²⁸	To present a snapshot of available non-biomedical stroke 'services' used by stroke survivors in two subdistricts of Aceh, Indonesia	Interviews, observations, focus groups, and vignettes	Massages, cupping (bekam), fruits (mangkur), other herbal treatments, prayers. Other methods included internal massage (totok), exercise, movement facilitation, deep reflex stimulation to awake the dead limb	Not applicable	These methods were largely tied to religion, 2 and as such treatment leading to a cure is viewed as tied more to Allah's wishes more so than the healer's treatment.

Pradipta <i>et al.</i> ²⁹	To analyse the proportion of traditional medicine users among chronic disease patients and its associated characteristics to optimize the use of traditional medicine in Indonesia	Self-reported questions	Not specified	Not applicable	31.7% of stroke patients use traditional medicines.	5
Sibbritt <i>et al.</i> ³⁰	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.	Barthel index emotion, pain and sleep patterns on a 10-point visual analogue scale	All patients had herbal compress, Thai massage, and herbal bath	Nil	Statistically significant improvement ($p < 0.01$) at one and three months for Barthel Index (6.1 and 12.4 points respectively), emotion (0.7 and 1.1 points respectively), pain (0.5 and 0.6 points respectively), and sleep (0.5 and 0.6 points respectively). The improvements in Barthel Index at one and three months, as well as the improvements in mood at three months were clinically significant.	4
Thanakiatipinyo <i>et al.</i> ³¹	To study the efficacy of traditional Thai massage versus conventional physical therapy programs in treating muscle spasticity, functional ability, anxiety, depression, and quality of life in Thai stroke patients.	Modified Ashworth Scale, Barthel Index, Thai Hospital Anxiety and Depression Scale, Pictorial Thai Quality of Life, adverse events, and subjective function, spasticity, and satisfaction	Court-type traditional Thai massage, two non-consecutive days per week for 6 weeks, standardised according to a Thai massage organisation.	A range of motion exercises for paralyzed limbs, strengthening exercises for sound limbs, balance exercises, ambulation training, administered by a trained physical therapist	Improvements seen in both intervention and control groups, although no significant difference in improvements in Barthel Index ($p = 0.805$), spasticity ($p = 0.286$), quality of life ($p = 0.715$), anxiety ($p = 0.144$), or depression ($p = 0.313$) between traditional Thai massage and standard physical therapy. However, anxiety and depression showed a decreasing trend in the traditional Thai massage group compared to the standard physical therapy group.	3
van der Riet <i>et al.</i> ^(a) ³²	To document the narratives of nursing staff in a Thai rehabilitation centre where complementary therapies are used and to discuss perceived progress of these complementary therapies on stroke patients	Semi-structured interviews on nurses' experience on the changes or improvements in patients' physical abilities, and their role in complementary therapy practice	Thai massage, and herbal treatments	Not applicable	Subjective descriptions of improvements in muscle tone, stiffness, muscle spasms, as well as improvements in ADLs by the Barthel Index, sleep, pain, mood.	5
van der Riet <i>et al.</i> ^(b) ³³	To document the narratives of nursing staff and patients in a Thailand Rehabilitation Centre where complementary therapies are used and to discuss perceived progress of these stroke patients.	Semi-structured interviews, to obtain basic demographics, patient's experiences, their views on Thai massage and herbal treatments, as well as physical problems	All patients had herbal compress, Thai massage, and herbal bath	Not applicable	Accounts of improvements in mobility, strength, sleep, pain, mood, ADLs, tone. One account of no improvement in power.	5

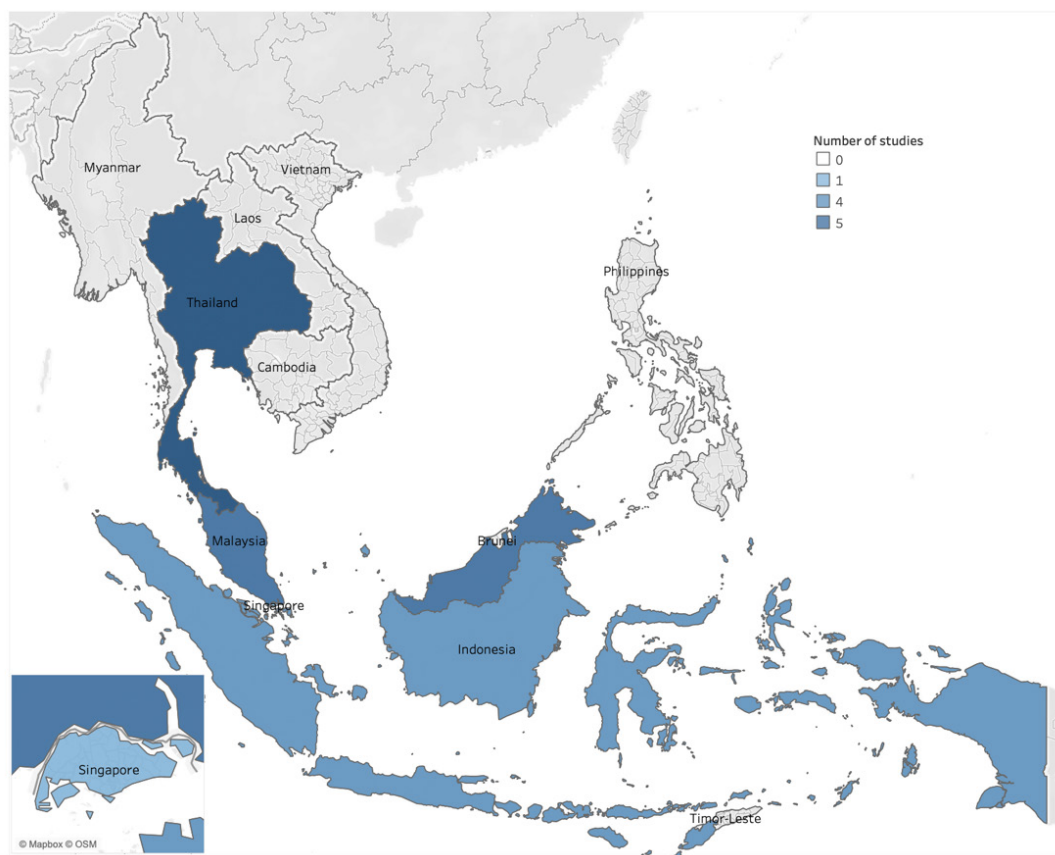


Figure 2. Countries of origin of included studies

massage against 26 participants receiving physical therapy for 6 weeks. Similar to Kamalashiran *et al.*²⁴, no significant difference in quality of life or functional abilities were noted between the two groups, nor was there any difference in spasticity outcomes. However, there was a decrease in anxiety and depression scores in the traditional Thai massage group, which was not observed in the conventional physical therapy group. Three papers looked at the impact of traditional Thai massages, together with herbal compresses and baths, in a private rehabilitation centre in Northern Thailand.^{30,32,33} Sibbritt *et al.*³⁰ is a prospective cohort study of 62 patients in this rehabilitation centre, describing improvements in Barthel Index, emotion, pain, and sleep over three months. van der Riet *et al.* (a)³² and van der Riet *et al.* (b)³³ however, are qualitative studies utilising narrative inquiry to examine the views of nurses and patients at this rehabilitation centre. Both these groups largely described subjective improvements in muscle tone, stiffness, spasms, Barthel Index, as well as sleep, pain and mood, though one patient reported no improvements in power. A

strong theme of holistic care to improve patient's self-confidence was emphasised in these papers.

Jullamate *et al.*²² depicted interviews of 20 caregivers of stroke survivors, describing the use of traditional herbs in treatment, including descriptions of Buddhist monks who visited homes to provide traditional treatments, as well as crucial social support to caregivers and patients.

Malaysia

The use of CAM in post-stroke patients is in Malaysia described in five studies.^{18–20,23,26} The use of *urut Melayu* is elucidated in two studies. *Urut Melayu*, a Malay traditional medicine, is a type of massage, which is conducted on the entire body regardless of the side of the stroke with use of medicated oil or coconut oil. It is carried out by *urut Melayu* practitioners who are identified by word of mouth. A case report by Fadzil *et al.*²⁰ reported the use of 12 sessions of *urut Melayu* in a 32-year-old woman with stroke due to hypoxic ischemic encephalopathy. It described the improvement of her activities of daily living such as sitting, standing, bathing

and toileting after the treatment. The patient also reported an improvement in her speech, sleep, appetite, fine motor skills and mood. A qualitative study by Anuar *et al.*¹⁹ conducted semi-structured interviews with 17 post-stroke patients undergoing *urut Melayu* treatment concurrently with physiotherapy and showed that 16 patients reported accounts of improvement in function such as driving, as well as feelings of relaxation and rejuvenation. Some patients thought more preferably of *urut Melayu* compared to physiotherapy, but most patients reported that both were of equal importance, with one patient citing that *urut Melayu* made them be able to do better in physiotherapy. Notably, three patients who were getting acupuncture treatment stopped going for acupuncture once they switched to *urut Melayu*, citing that they appreciated the interpersonal communication of *urut Melayu*. One patient stated that they found *urut Melayu* to be more comforting compared to acupuncture which caused pain and bruising.

The other three studies from Malaysia described a more general usage of CAM. A cross-sectional study by Ali *et al.*¹⁸ found that 69 out of 104 patients used traditional and complementary medicine concurrently while attending conventional stroke rehabilitation. This however included some users of TCM with majority of the CAM used being acupuncture. When looking at non-TCM and non-Ayurvedic medicine, it was found that the frequency of use of mind body medicine was 6.7% (2.9% prayers, 1.9% exercise, dance or yoga and 1.9% energy healing therapies), biological based was 9.6% (7.7% herbs and 1.9% vitamins), homeopathy was 1.0% and manipulative and body-based therapy was 43.3% (40.4% massage and 2.9% cupping). Most of the patients agreed that CAM was helpful in alleviating stroke symptoms. A prospective cohort study by Kadir *et al.*²³ involving 93 stroke patients found that 66.7% used CAM, with 36.6% using massage, 97.8% using herbal therapies and 86% using vitamins, 91% using traditional healers and 3.2% using other types of CAM. None of the patients in the cohort used TCM. Furthermore, multiple logistic regression analysis found a significant benefit in the modified Barthel Index with CAM usage, with an odds ratio of 1.034 (95% confidence interval: 1.01-1.06). Lastly, a qualitative study by Mairami *et al.*²⁶ through semi-structured interviews noted that the majority of participants reported the use of CAM. This included treatments such as traditional Malay and Islamic medicine such as massages, herbal

medication, homeopathy and reflexology. One participant reported how the traditional massage helped him with walking and facial droop. However, one patient reported adverse impacts of the CAM, specifically pain from massages and the poor palatability of medications. A few patients found that the CAM did not provide them benefit. CAM practitioners were found to also have aided in providing information about stroke, possible causes, exercises, and dietary advice. They also provided encouragement and holistic support, boosting morale and aiding recovery.

Indonesia

Four studies from Indonesia were identified for this review.^{21,27-29} Pradipta *et al.*²⁹ described a cross-sectional analysis of traditional medicine use across individuals with chronic diseases, including stroke. 31.7% of the stroke population in this study, or 71 participants, had used traditional medicine, though the type of traditional medicine used was not specified.

Farhana *et al.*²¹ employed a quasi-experimental methodology to evaluate the effectiveness of *Gotu Kola* on post-stroke vascular cognitive impairment. *Gotu Kola* is a medicinal herb that has been used extensively in Java, India, and China for centuries as a cure-all for a host of diseases.³⁵ It has been used to promote wound healing, improve cognitive function, reduce anxiety and stress, and support circulatory health. *Gotu Kola* was compared against folic acid supplementation for improvements in neurocognitive deficits as measured by the Montreal Cognitive Assessment - Indonesian version over 6 weeks. *Gotu Kola* showed a significantly better improvement in delayed memory recall, though there were no difference in overall cognitive impairment.

Norris *et al.* (a)²⁷ and Norris *et al.* (b)²⁸ described semi-structured interviews and observations of stroke survivors in Aceh, a rural region in Indonesia reporting the highest rate of stroke in the country.³⁶ Both papers described deep reflex stimulation in weakened limbs as well as an internal massage called *totok*, making use of practitioners' internal energy to improve clients' blood flow and coax spirits out. Norris *et al.* (a)²⁷ depicted individuals who have undergone *bekam* - a traditional method of cupping - to suck up 'dirty blood' and improve stroke recovery, stemming from cultural beliefs that occult forces and spirits contaminating one's blood are part of the disease process.

Singapore

One study from Singapore was included in this systematic review.²⁵ Lee *et al.*²⁵ performed a cross-sectional study of 488 patients with chronic diseases including but not limited to stroke, diabetes mellitus, hypertension, coronary artery disease and dyslipidaemia. There were 13 stroke patients who reported the use of CAM, of which 6 patients reported the use of CAM that was not TCM or acupuncture.

DISCUSSION

Southeast Asia, home to nearly 700 million people², is among the most culturally, socially, and economically diverse regions globally. Despite this, its traditional medicine practices remain grossly understudied. This is particularly so for non-TCM and non-Ayurvedic CAM, which is rooted in rich, millennia-old indigenous customs and still see widespread use, especially in rural communities.³⁷ This is the first review to consolidate existing research on non-TCM, non-Ayurvedic CAM in stroke patients in ASEAN.

There are a limited number of published manuscripts on this topic, numbering only 16 primary studies from four countries in the region. This highlights the need for more studies and publication of data in order to understand the practices and preferences of stroke patients in our region, and importantly how it may impact evidence-based stroke care. Understanding the types of CAM used is important to ensure their safety, identify possible interactions with conventional therapies, as well as to examine the effect CAM use has on adherence to Western medicines. A generational reliance on traditional medicines may also pose a barrier to the rapid adoption of modern therapies, even if widespread access is achieved throughout the region. Evidence suggests expanding patient knowledge of Western Medicine and CAM interplay, along with incorporating traditional healers into the public health system catalyses the achievement of better health system outcomes.³⁸

Across the diverse cultures in the Southeast Asian regions, several common themes in the use of CAM therapies were identified in this review. Broadly speaking, these can be categorised into three groups: traditional massages, herbal supplements, as well as spiritual and energy healing methods. Traditional massages, such as *urut Melayu* and traditional Thai massages have been used in functional rehabilitation to reduce spasticity, pain, and improve power post-

stroke. Randomised controlled trials comparing traditional Thai massages demonstrating equal efficacy to standard physiotherapy does support the use of these therapies. However, larger and more comprehensive studies are required to better define and formalise the role these therapies could play in clinical practice. Herbal supplements were widely used across the region, though quantitative data was only provided for *Gotu Kola*.

This review documented qualitative and quantitative evidence of benefits like reduced anxiety, enhanced mood, and holistic functional recovery. However, evidence for significant benefit over standard medical therapy in objective clinical outcomes were limited. There was evidence of the role which non-TCM non-Ayurvedic CAM could play as a potential adjunct to conventional treatment of stroke patients. These were expounded on in the studies from Malaysia and Thailand. For example, Mairami *et al.*²⁶ which reported improved patient receptiveness toward healthcare advice on modifying cerebrovascular risk factors of diet and exercise post-stroke, when said advice was given by CAM practitioners.

This systematic review has a few limitations. First, studies from only four Southeast Asian countries were identified and included in the review. This may be due to inherent difficulties in recruiting patients as they might be from rural communities who are less likely to visit a healthcare institution. Additionally, there may be non-English studies published in local journals. Second, most of the studies were qualitative in nature, thus conclusions that can be drawn are limited. Third, CAM itself has been used to describe a nebulously expansive array of techniques with substantial heterogeneity.³⁹ Fourth, the diagnostic procedures and descriptions of the effects of CAM were also poor in certain studies. Subjective reporting from the study participants may have introduced bias and reduced reproducibility, thereby reducing result reliability.

More research on CAM, particularly non-TCM and non-Ayurvedic treatments, in stroke patients across all countries in the ASEAN region are needed and should preferably include objective outcomes. In addition, studies on the impact of CAM use on conventional treatments, cost-effectiveness and physicians' perspective would provide insights of current practices and how to proactively integrate CAM with conventional stroke care.

In conclusion, there is a severe paucity of published literature on non-TCM and non-Ayurvedic CAM use in stroke patients in the

ASEAN region despite likely widespread use. There is some evidence of potential benefit but these are limited to subjective patient-reported outcomes. More research is needed to understand its impact and how best to complement conventional stroke care without compromising outcomes.

DISCLOSURE

Financial support: None

Conflicts of interest: None

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[illegible]

#4	#1 AND #2 AND #3	811
Embase		
#1	('stroke'/exp OR stroke OR 'cerebrovascular accident'/exp OR 'cva'/exp OR cva OR cvas) AND ([article]/lim OR [article in press]/lim) AND [english]/lim AND [humans]/lim AND ([embase]/lim OR [medline]/lim OR [preprint]/lim OR [pubmed-not-medicine]/lim) AND [medline]/lim	251,108
#2	('traditional medic*' OR 'traditional treatment*' OR 'traditional therap*' OR 'complementary medic*' OR 'complementary treatment*' OR 'complementary therap*' OR 'alternative medic*' OR 'alternative treatment*' OR 'alternative therap*' OR 'herb*' OR 'herbal' OR 'acupunctur*' OR 'chondroitin*' OR 'collagen*' OR 'chiroprac*' OR 'coining' OR 'supplement' OR 'aromatherap*' OR 'aromatic oil*' OR 'balm' OR 'homeopath*' OR 'osteopath*' OR 'naturopath*' OR 'natural medic*' OR 'holistic health'/'exp OR 'fish oil'/'exp OR 'fish oil' OR 'balm' OR 'homeopath*' OR 'osteopath*' OR 'naturopath*' OR 'natural medic*' OR 'holistic health'/'exp OR 'holistic health' OR 'spiritual therap*' OR 'spiritual healing'/'exp OR 'spiritual healing' OR 'faith healing'/'exp OR 'faith healing'/'exp OR 'shaman*' OR 'meditation'/'exp OR 'meditation' OR 'mind body medicine'/'exp OR 'mind body medicine' OR 'mind body therap'/'exp OR 'mind body therap'/'exp OR 'prayer'/'exp OR 'prayer' OR 'energy healing therap*' OR 'magnetic healing' OR 'massage'/'exp OR 'massage'/'exp OR 'cupping'/'exp OR 'cupping' OR 'reflexology'/'exp OR 'reflexology' OR 'witchcraft'/'exp OR 'witchcraft' OR 'relaxation therap'/'exp OR 'relaxation therap'/'exp OR 'alexander technique'/'exp OR 'alexander technique' OR 'kinesiology'/'exp OR 'kinesiology' OR 'hypnosis'/'exp OR 'hypnosis' OR 'manual therap'/'exp OR 'manual therap'/'exp OR 'feldenkrais' OR 'feldenkrais' OR 'moxibustion'/'exp OR 'moxibustion' OR 'naprapathy'/'exp OR 'naprapathy' OR 'pilate*' OR 'reiki'/'exp OR 'reiki'/'exp OR 'shiatsu'/'exp OR 'shiatsu' OR 'therapeutic touch'/'exp OR 'therapeutic touch' OR 'oil'/'exp OR 'oil' OR 'art therap'/'exp OR 'art therap'/'exp OR 'anthroposophy'/'exp OR 'anthroposophy' OR 'balneotherapy'/'exp OR 'balneotherapy' OR 'balneo*' OR 'hydrotherapy'/'exp OR 'hydrotherapy'/'exp OR 'hydrotherap*' OR 'craniosacral' OR 'emotional freedom' OR 'guided imagery'/'exp OR 'guided imagery' OR 'guided imagery'/'exp OR 'mindfulness'/'exp OR 'mindfulness' OR 'music therap'/'exp OR 'music therap' OR 'trager' OR 'tea'/'exp OR 'tea' OR 'laughter therap'/'exp OR 'laughter therap'/'exp OR 'laughter therap'/'exp OR 'vitamin'/'exp OR 'vitamin' OR 'yoga'/'exp OR 'yoga' AND ([article]/lim OR [article in press]/lim) AND [english]/lim AND [humans]/lim AND ([embase]/lim OR [medline]/lim OR [preprint]/lim OR [pubmed-not-medicine]/lim) AND [medline]/lim	1,468,915

#3	(southeast AND ('asia'/exp OR asia) OR asean OR 'association of southeast asian nations' OR 'borneo'/exp OR borneo OR 'brunei'/exp OR 261,065 brunei OR 'burma'/exp OR burma OR 'burmese'/exp OR burmese OR 'myanmar'/exp OR myanmar OR 'cambodia'/exp OR cambodia OR 'indochina'/exp OR indochina OR 'indonesia'/exp OR indonesia OR 'indonesian'/exp OR indonesian OR javanese OR 'laos'/exp OR laos OR 'laotian'/exp OR laotian OR 'malaysia'/exp OR malaysia OR 'malaysian'/exp OR malaysian OR (mekong AND valley) OR 'philippines'/ exp OR philippines OR 'filipino'/exp OR filipino OR pinoy OR 'singapore'/exp OR singapore OR 'singaporean'/exp OR singaporean OR 'thailand'/exp OR thailand OR 'thai'/exp OR thai OR 'timor leste'/exp OR 'timor leste' OR 'vietnam'/exp OR vietnam OR 'vietnamese'/exp OR vietnamese) AND ([article]/lim OR [article in press]/lim) AND [english]/lim AND [humans]/lim AND [embase]/lim OR [medline]/lim OR [preprint]/lim OR [pubmed-not-medicine]/lim) AND [medicine]/lim
#4	#1 AND #2 AND #3 729
Scopus	
#1	(ALL (stroke OR cerebrovascular AND accident OR cerebrovascular AND accidents OR cva OR cvas) AND ALL ("Traditional medic*" OR "Traditional treatment*" OR "Traditional therap*" OR "Complementary medic*" OR "Complementary treatment*" OR "Complementary therap*" OR "Alternative medic*" OR "Alternative treatment*" OR "Alternative therap*" OR "Integrative medic*" OR "Integrative treatment*" OR "Integrative therap*" OR "Herbal" OR "Herb*" OR "extract*" OR "Plant based" OR "Plant" OR "Algae" OR "Aromatherap*" OR "Aromatic oil*" OR "Acupunctur*" OR "Chondroitin*" OR "Collagen*" OR "Chiroprac*" OR "Coining" OR "Supplement" OR "Fish oil" OR "Balm" OR "Homeopath*" OR "Kinesiology" OR "Osteopath*" OR "Shaman*" OR "Meditation" OR "Mind body medicine" OR health" OR "Spiritual therap*" OR "Faith healing" OR "Faith healing" OR "Massage" OR "Cupping" OR "Reflexology" OR "Witchcraft" "Mind body therap*" OR "Massage" OR "Prayer" OR "Magnetic healing" OR "Autogenic training" OR "Bowen" OR "Feldenkrais" OR "Kinesiology" OR "Hypnosis" OR "Relaxation therap*" OR "Alexander technique" OR "Moxibustion" OR "Manipulation*" OR "Moxibustion" OR "Pilates" OR "Shiatsu" OR "Therapeutic touch" OR "Oil" OR "Art therap*" OR "Anthroposophy" OR "Balneo*" OR "Hydrotherapy" OR "Hydrotherap*" OR "Craniosacral" OR "Emotional freedom" OR "Guided imagery" OR "Mindfulness" OR "Music therap*" OR "Trager" OR "Tea" OR "Laughter therap*" OR "Vitamin" OR "Yoga") AND ALL (southeast AND asia OR asean OR "Association of Southeast Asian Nations" OR borneo OR brunei OR burma OR burmese OR myanmar OR cambodia OR indochina OR indonesia OR indonesian OR javanese OR laos OR laotian OR malaysia OR malaysian OR mekong AND valley OR philippines OR filipino OR pinoy OR singapore OR singaporean OR thailand OR thai OR timor-leste OR vietnam OR vietnamese)) 252

Supplementary Table 2: Mixed method appraisal Tool for included studies

No.	Author	Screening Questions		Qualitative Studies					Randomised Controlled Trials					Non-Randomised Studies					Quantitative Descriptive Studies					Score (/5)
		S1	S2	1.1	1.2	1.3	1.4	1.5	2.1	2.2	2.3	2.4	2.5	3.1	3.2	3.3	3.4	3.5	4.1	4.2	4.3	4.4	4.5	
1	Ali et al	Y	Y	Y	Y	Y	Y	Y						Y	Y	Y	N	Y						4
2	Anuar et al	Y	Y	Y	Y	Y	Y	Y																5
3	Fadzil et al	Y	Y																Y	Y	Y	Y	Y	5
4	Farhana et al	Y	Y												Y	Y	Y	Y						5
5	Jullamate et al	Y	Y	Y	Y	Y	Y	Y																5
6	Kadir et al	Y	Y											Y	Y	Y	Y	Y						5
7	Kamalashiran et al	Y	Y						C	Y	Y	Y	Y											4
8	Lee et al	Y	Y											Y	Y	Y	Y	Y						5
9	Mairami et al	Y	Y	Y	Y	Y	Y	Y																5
10	Norris et al (a)	Y	Y	Y	Y	Y	Y	Y																5
11	Norris et al (b)	Y	Y	Y	C	Y	C	C																2
12	Pradipta et al	Y	Y											Y	Y	Y	Y	Y						5
13	Sibbritt et al	Y	Y											Y	Y	N	Y	Y						4
14	Thanakiatpinyo et al	Y	Y						Y	N	N	Y	Y											3
15	van der Riet et al (a)	Y	Y	Y	Y	Y	Y	Y																5
16	van der Riet et al (b)	Y	Y	Y	Y	Y	Y	Y																5

Y - Yes

N - No

C - Cannot tell

S1 - Are there clear research questions?

S2 - Do the collected data allow to address the research questions?

1.1 - Is the qualitative approach appropriate to answer the research question?

1.2 - Are the qualitative data collection methods adequate to address the research question?

1.3 - Are the findings adequately derived from the data?

1.4 - Is the interpretation of results sufficiently substantiated by data?

1.5 - Is there coherence between qualitative data sources, collection, analysis and interpretation?

2.1 - Is randomization appropriately performed?

2.2 - Are the groups comparable at baseline?

2.3 - Are there complete outcome data?

2.4 - Are outcome assessors blinded to the intervention provided?

2.5 - Did the participants adhere to the assigned intervention?

3.1 - Are the participants representative of the target population?

3.2 - Are measurements appropriate regarding both the outcome and intervention (or exposure)?

3.3 - Are there complete outcome data?

3.4 - Are the confounders accounted for in the design and analysis?

3.5 - During the study period, is the intervention administered (or exposure occurred) as intended?

4.1 - Is the sampling strategy relevant to address the research question?

4.2 - Is the sample representative of the target population?

4.3 - Are the measurements appropriate?

4.4 - Is the risk of nonresponse bias low?

4.5 - Is the statistical analysis appropriate to answer the research question?