

Prevalence of Complementary and Alternative Medicine Used by Stroke Patients in Siriraj Hospital, Thailand

Harnphadungkit K and Poompreecha K

Department of Rehabilitation Medicine, Faculty of Medicine Siriraj Hospital,
Mahidol University, Bangkok, Thailand

ABSTRACT

Objectives: To study the prevalence of complementary and alternative medicine (CAM) use and related factors among stroke patients in Siriraj Hospital.

Study design: Cross-sectional descriptive study.

Setting: Inpatient and outpatient of the Departments of Internal Medicine and Rehabilitation Medicine, Siriraj Hospital.

Subjects: Stroke patients (at least 3 months after onset), age at least 18 years.

Methods: Data collected by questionnaire-based study on stroke patients or their relatives.

Results: Three hundred and nine stroke patients were recruited, 59.2% were male. Mean age was 65.2 (SD 12.3) years. The prevalence of CAM use in stroke patients was 40.8%. The most common CAM used was Thai massage (56.3%) followed by acupuncture (44.4%), traditional Thai herb and medication (36.5%) and traditional Chinese herb and medicine (15.9%). The main reasons for CAM used were muscle strength improvement (58.7%), controlling spasticity (41.3%), improving walking ability (37.3%), and pain reduction (25.4%). Treatments with CAM started from suggestions from families or friends (58.7%) and physicians and healthcare professions (23.8%). The total cost per month of CAM use that was less than 1,000 baht was 40.5%. Complication rate was 16.7%. Ecchymosis or bruise was the most common complication. Regarding satisfaction rate, CAM users rated extremely satisfied, satisfied and neutral 19.0%, 48.4% and 27.0%, respectively.

Conclusion: About 40% of stroke patients used CAM. The frequent CAM treatments chosen were traditional Thai and Chinese medicine suggested by their relatives and friends. Though, there were some complications, stroke patients were still satisfied with CAM.

Keywords: complementary medicine, alternative medicine, poststroke, prevalence, Thai traditional medicine

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Introduction

Stroke is a common health problem in the world, including Thailand. It is the leading cause of death and one of the

top five causes of disability-adjusted life years in Thailand.⁽¹⁾ Though acute stroke treatment had been advanced and improved, stroke survivors still faced with impairments and disabilities such as weakness, numbness, mobility and communication limitations. Rehabilitation program during early and intensive post-acute phase is aimed at reducing impairments and disability. After completion of medical rehabilitation program, impairments and disability may remain and some stroke survivors seek complementary and alternative medicine (CAM) to solve their remaining problems.^(2,3)

Complementary and alternative medicine (CAM) means a broad set of health care practices that is not part of conventional medicine and is not fully integrated into the dominant health care system.⁽⁴⁾ In Thailand, the examples of common CAM treatments are massage, exercise, herbals and acupuncture.⁽³⁾ The main reasons of using CAM in Thailand are pain treatment and relaxation. The Thai National policy aimed to develop, promote and set standards of the Thai traditional and alternative medicine in the country. So the Department of Thai Traditional and Alternative Medicine was established in the Ministry of Public Health. Thereafter, Thai traditional medicine (TTM) clinics have been established in over 80% of the public hospitals.⁽⁵⁾ Several types of CAM treatment such as TTM, Thai massage, traditional Chinese medicine (TCM), acupuncture used by stroke survivors had been reported in Thailand.⁽⁶⁾ The prevalence of CAM used in stroke patients in India was 36.3%⁽⁷⁾ but the prevalence in Thailand was not known. Hence, this study was performed to report the prevalence of CAM use and related factors among stroke patients.

Methods

This cross-sectional descriptive study was conducted at Siriraj Hospital-Thailand's largest university-based center (Bangkok, Thailand). The protocol for this study was approved by the Siriraj Institutional Review Board (SIRB), Faculty of Medicine Siriraj Hospital, Mahidol University (Si 728/2558(EC4)). Stroke patients at outpatient clinic and inpatient wards of Rehabilitation Medicine and Internal Medicine Departments were invited to participate in the study. All

Correspondence to: Kamontip Harnphadungkit, MD, FRCPhysiatrT; Department of Rehabilitation Medicine, Faculty of Medicine, Siriraj Hospital, Mahidol University, 2 Prannok Road, Bangkoknoi, Bangkok 10700, Thailand. E-mail: kamontip.har@mahidol.ac.th; kamontip.har@gmail.com

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participants provided informed consent before joining the study.

Participants

Inclusion criteria

- Age more than 18 years old
- Onset $\geq$ 3 months
- Normal consciousness and able to complete the paper-and-pencil questionnaire or caregiver could be a proxy.

Exclusion criteria

- Non-Thai nationality
- Inability to communicate

Participants completed the questionnaires which included demographic data, stroke characteristics and complementary and alternative medicine use.

Sample size calculation was based on the prevalence of Pandian JD study⁽⁷⁾ at 95% confidence interval and 5.5% allowable error. The calculated sample size was 289. The oversample by 5% was 305.

Statistical analysis

Predictive analytics software (PASW) statistics version 18.0 (SPSS Inc., Chicago, IL, USA) was used for statistical

analysis. Descriptive statistics were used for subject characteristics. Unpaired t-test was used to compare quantitative data while Chi-square test was used for qualitative data. Statistical significance was set at < 0.05 .

Results

Table 1 and 2 show participants' characteristics and comorbidities. Table 3 shows stroke types, related symptoms, and history of rehabilitation program. In total, 309 stroke patients agreed to participate in the study. Participants had a mean age of 65.2 (SD 12.3) years. There were 183 males (59.2%) and 126 females (40.8%). Duration post stroke was 43.6 (SD 50.4) months. The total number of CAM user was 126, so the overall prevalence was 40.8%. There was no statistically significant difference between CAM and non-CAM users in almost all aspects. However, most patients with hypertension used CAM (Table 2) ($p = 0.012$). Regarding stroke and its related problems, patients with either ischemic stroke or hemorrhagic stroke ($p = 0.025$), spasticity ($p < 0.001$) and constipation ($p < 0.017$) were more likely to use CAM (Table 3) while those without weakness ($p < 0.001$) were the

Table 1. Demographic data of participants and comparison between CAM and non CAM users

		Total (n=309)	CAM user (n=126)	Non CAM user (n=183)	p-value
Sex ¹	Male	183 (59.2)	80 (63.5)	103 (56.3)	0.239
	Female	126 (40.8)	46 (36.5)	80 (43.7)	
Age (year) ²		65.2 (12.3)	64.0 (11.7)	66.1 (12.6)	0.141
Religion ¹	Buddhism	303 (98.1)	124 (98.4)	179 (97.8)	1.000
	Others	6 (1.9)	2 (1.6)	4 (2.2)	
Education ¹	No education	15 (4.9)	7 (5.6)	8 (4.4)	0.731
	Elementary	104 (33.7)	40 (31.7)	64 (35.0)	
	Secondary	86 (27.8)	33 (26.2)	53 (29.0)	
	Higher education	96 (31.1)	43 (34.1)	53 (29.0)	
Career ¹	No career	145 (46.9)	61 (48.4)	84 (45.9)	0.983
	State officer	24 (7.8)	10 (7.9)	14 (7.7)	
	Retired officer	54 (17.5)	21 (16.7)	33 (18.0)	
	Others	82 (26.5)	34 (27.0)	48 (26.2)	
Income ¹	Yes	128 (41.4)	51 (40.5)	77 (42.1)	0.906
	No	176 (57.0)	72 (57.1)	104 (56.8)	
Family's income (Baht) ¹	< 10,000	67 (21.7)	24 (19.0)	43 (23.5)	0.462
	10,001-100,000	198 (64.1)	87 (69.0)	111 (60.7)	
	> 100,000	19 (6.1)	7 (6.5)	12 (6.6)	
Birthplace ¹	Bangkok	223 (72.2)	91 (72.2)	132 (72.1)	0.917
	Central region	42 (13.6)	16 (12.7)	26 (14.2)	
	Others	40 (12.9)	17 (13.5)	23 (12.6)	
Caregiver ¹	No	49 (15.9)	16 (12.7)	33 (18.0)	0.267
	Yes	260 (84.1)	110 (87.3)	150 (82.0)	
	Relative	200 (64.7)	86 (68.3)	114 (62.3)	
	Hired caregiver	34 (11.0)	11 (8.7)	23 (12.6)	
Smoking ¹	Smoker	8 (2.6)	4 (3.2)	4 (2.2)	0.337
	Non-smoker	217 (70.2)	83 (65.9)	134 (73.2)	
	Ex-smoker	83 (26.9)	39 (30.9)	44 (24.0)	
Healthcare insurance ¹	Universal coverage	118 (38.2)	50 (39.7)	68 (37.1)	0.777
	Civil service welfare	134 (43.4)	50 (39.7)	84 (45.9)	
	Social security for employee	31 (10.0)	14 (11.1)	17 (9.3)	
	Others	23 (7.4)	10 (7.9)	13 (7.1)	

CAM, complementary and alternative medicine; ¹number (%), ²mean (SD)

Table 2. Underlying diseases of participants

	Total (n=309)	CAM user (n=126)	Non CAM user (n=183)	p-value
Diabetes mellitus	92 (29.8)	34 (27.0)	58 (31.7)	0.448
Hypertension	215 (69.5)	98 (77.8)	117 (63.9)	0.012*
Dyslipidemia	120 (38.8)	48 (38.1)	72 (39.3)	0.906
Liver disease	3 (1.0)	0 (0.0)	3 (1.6)	0.273
Gout	16 (5.2)	4 (3.2)	12 (6.6)	0.296
Ischemic heart disease	30 (9.7)	10 (7.9)	20 (10.9)	0.438
Chronic obstructive pulmonary disease	3 (1.0)	1 (0.8)	2 (1.1)	1.000
Asthma	2 (0.6)	0 (0.0)	2 (1.1)	0.515
Peripheral vascular disease	37 (12.0)	10 (7.9)	27 (14.8)	0.077
Chronic kidney disease	10 (3.2)	1 (0.8)	9 (4.9)	0.052
Osteoarthritis	14 (4.5)	6 (4.8)	8 (4.4)	1.000
Depression	11 (3.6)	4 (3.2)	7 (3.8)	1.000
Benign prostatic hypertrophy	13 (4.2)	8 (6.3)	5 (2.7)	0.152
Others	51 (16.5)	21 (16.7)	30 (16.4)	1.000

Number (%); * $p < 0.05$ indicates statistical significance

Table 3. Stroke, its related consequences and treatment of participants

		Total (n=309)	CAM user (n=126)	Non CAM user (n=183)	p-value
Type of stroke ¹	Either ischemic or hemorrhagic	285 (92.2)	122 (96.8)	163 (89.1)	0.025*
	Both ischemic and hemorrhagic	22 (7.1)	4 (3.2)	18 (9.8)	
Recurrent stroke ¹	Yes	42 (13.6)	14 (11.1)	28 (15.3)	0.312
	No	261 (84.5)	112 (88.9)	149 (81.4)	
Weakness ¹	Yes	289 (93.5)	126 (100)	163 (89.1)	< 0.001*
	No	20 (6.5)	0 (0)	20 (10.9)	
Duration of stroke (months) ²		43.6 (50.4)	40.8 (45.5)	45.5 (53.5)	0.412
Side of weakness ¹	Right	140 (45.3)	63 (50.0)	77 (42.1)	0.290
	Left	130 (42.1)	58 (46.0)	72 (39.3)	
	Both	19 (6.1)	5 (4.0)	14 (7.7)	
Neglect ¹	Yes	86 (27.8)	34 (27.0)	52 (28.4)	0.897
	No	220 (71.2)	90 (71.4)	130 (71.0)	
Swallowing function ¹	Can do	290 (93.9)	122 (96.8)	168 (91.8)	0.137
	Need help	18 (5.8)	4 (3.2)	14 (7.7)	
Communication ¹	Communicable	281 (90.9)	117 (92.9)	164 (89.6)	0.421
	Uncommunicable	28 (9.1)	9 (7.1)	19 (10.4)	
Spasticity ¹	Yes	186 (60.2)	93 (73.8)	93 (50.8)	< 0.001*
	No	121 (39.2)	33 (26.2)	88 (48.1)	
Bladder incontinence ¹	Controlled	259 (83.8)	109 (86.5)	150 (82.0)	0.190
	Cannot control	45 (14.6)	14 (11.1)	31 (16.9)	
Bowel incontinence ¹	Controlled	251 (81.2)	102 (81.0)	149 (81.5)	0.149
	Cannot control	36 (11.7)	10 (7.9)	26 (14.2)	
Constipation ¹	Yes	24 (7.8)	15 (11.9)	9 (4.9)	0.030*
	No	285 (92.2)	111 (88.1)	174 (95.1)	
Pain ¹	Yes	120 (38.8)	56 (44.4)	64 (35.0)	0.092
	No	175 (56.6)	64 (50.8)	111 (60.7)	
BADLs ¹	Independent	122 (39.5)	48 (38.1)	74 (40.4)	0.773
	Partially independent	148 (47.9)	61 (48.4)	87 (47.5)	
	Dependent	37 (12.0)	17 (13.5)	20 (10.9)	
Walking ¹	Ambulator	222 (71.8)	90 (71.4)	132 (72.1)	0.897
	Non- ambulator	86 (27.8)	36 (28.6)	50 (27.3)	
Main treatment ¹	Surgery	48 (15.5)	16 (12.7)	32 (17.5)	0.268
	Antiplatelet	208 (67.3)	88 (69.8)	120 (65.6)	0.461
	Tracheostomy	9 (2.9)	3 (2.4)	6 (3.3)	0.743
	Others	35 (11.3)	13 (10.3)	22 (12.0)	0.717
Rehabilitation program ¹	Yes	263 (85.1) [#]	120 (95.2)	143 (78.1)	< 0.001*
	At hospital	188 (60.8)	88 (69.8)	100 (54.6)	0.009*
	At home	138 (44.7)	58 (46.0)	80 (43.7)	0.727
	No	44 (14.2) [#]	5 (4.0)	39 (21.3)	

BADL, basic activities of daily living; ¹number (%), ²mean (SD); * $p < 0.05$ indicates statistical significance; [#]two missing data

non-CAM user. Patients with a history of receiving rehabilitation program tended to be a CAM user (Table 3) ($p < 0.001$).

Figure 1 shows the types of CAM used. The most common types of CAM used were Thai massage (56.3%), acupuncture (44.4%) and traditional Thai herb and medication (36.5%). Most CAM users used 1-3 types of CAM. The average number of CAM type used was 1.96 (range 1-10). Among the CAM users, there were 54 (42.9%) using one type, 41 (32.5%) using two types and 23 (18.2%) using three types of CAM.

Figure 2 shows the reasons for using CAM. The top three most common reasons were muscle strength improvement, spasticity reduction, and walking ability improvement whereas health conditions significantly related to CAM use were spasticity and constipation as shown in Table 4. The majority of CAM users got information about CAM from friends or relatives (58.7%), doctors or health care providers (23.8%), other people (14.3%), media (television and news-

paper) (11.9%), internet (4.8%) and personal belief (3.4%). The monthly cost of CAM therapy was less than 1000 baht (40.5%), between 1,001-5,000 baht (38.9%), between 5,001-10,000 baht (7.1%), between 10,001-30,000 baht (4.8%) and over 30,000 baht (2.4%). In addition, 16.7% of CAM users experienced complications such as bruises (23.8%) and edema (9.5%). The CAM users rated as satisfied (48.4%), very satisfied (19.0%), neutral (27.0%) and unsatisfied (4.8%).

Discussion

The prevalence of CAM users among stroke survivors in this study was 40.8% which fell in the range of the previously reported rates, 26.5%-67%.⁽⁷⁻¹¹⁾ The difference in prevalence rate may be attributed to post-stroke duration, variety of CAM, accessibility to CAM, cost of therapy, reimbursement system and belief including knowledge of traditional medicine of each country or area. Thailand is the country which

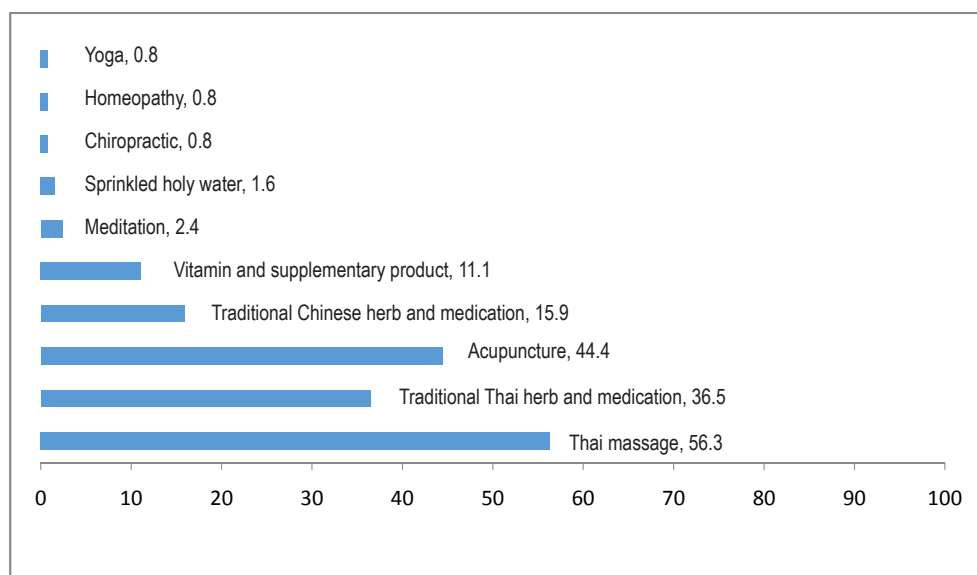


Figure 1. Types of CAM used in percentage

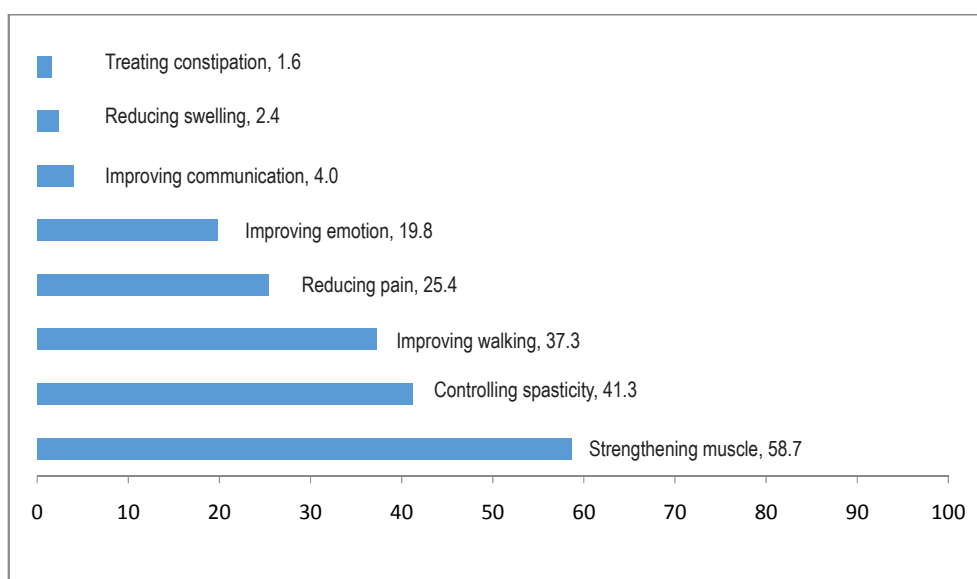


Figure 2. Reasons of using CAM in percentage

Table 4. Types of CAM used for muscle strengthening, improving walking, controlling spasticity and treating constipation

CAM Type	Strengthening muscle	Improving walking	Controlling spasticity	Treating constipation
Thai Massage	34 (45.9)	27 (57.4)	54 (58.1)	10 (66.7)
Traditional Thai herb and medication	30 (40.5)	24 (51.1)	34 (36.6)	6 (40.0)
Acupuncture	43 (58.1)	21 (44.7)	44 (47.3)	9 (60.0)
Chinese massage	3 (4.1)	-	3 (3.2)	-
Traditional Chinese herb and medication	15 (20.3)	7 (14.9)	16 (17.2)	1 (6.7)
Vitamin and supplement	7 (9.5)	6 (12.8)	8 (8.6)	-
Meditation	3 (4.1)	2 (4.3)	1 (1.1)	-
Sprinkled holy water	1 (1.4)	-	2 (2.2)	-
Chiropractic	1 (1.4)	1 (2.1)	1 (1.1)	-
Homeopathy	1 (1.4)	1 (2.1)	1 (1.1)	-
Total	74 (100.0)	47 (100.0)	93 (100.0)	15 (100.0)

Number (%)

has variety of culture. Thai population is composed mainly of Thai ethnic and Chinese ethnic. This is why the most common types of CAM used were Thai massage (56.3%), acupuncture (44.4%), traditional Thai herb and medication (36.5%) and traditional Chinese herb and medicine (15.9%). The finding that showed massage was the most frequently used CAM was consistent with the previous report by Kadir in Malaysia.⁽¹⁰⁾ Acupuncture, part of traditional Chinese medicine, was also popular like the study of Shah in the United States of America.⁽⁹⁾ In our study, about 90% of CAM users used 1-3 types of CAM while 40% used only one type of CAM.

About comorbidities, our study revealed that those with hypertension were likely to be CAM users, same as the previous research from India.⁽⁷⁾ Moreover, some with chronic kidney disease (CKD) used CAM, this indicated that they were not aware of the potential toxicity of herbs prescribed. Therefore, healthcare providers should be aware of non-prescription herbal medications and warn those with CKD to avoid toxicity.

Conditions that were significantly related to CAM users were spasticity and constipation. Spasticity is a common consequence of stroke and usually impairs functional outcome. Constipation is another health condition seldom mentioned. Top five reasons for using CAM were strengthening muscle, controlling spasticity, improving walking ability, reducing pain and improving emotion. These suggest that stroke patients suffer from both physical and psychological problems and need holistic approach. Controlling spasticity, strengthening muscle power and improving walking are aimed at correcting motor impairments. Sorted by descending order, Thai massage, acupuncture and traditional Thai herb and medication were CAM frequently used in spasticity (Table 4). Constipation was reported to be a common gastrointestinal problem in stroke survivors, about 20-30%.⁽¹²⁻¹⁴⁾ Its incidence was high during rehabilitation phase, 48-79%.^(15,16) In our study, constipation was found to be a significant health condition leading to using CAM but its percentage in our study was only 7.5%, rather low compared to the previous reports,⁽¹²⁻¹⁶⁾ suggesting that constipation might be neglected but requires treatment.

Interesting findings from our study, 85% of stroke patients received rehabilitation program and nearly all (95%) having a hospital-based rehabilitation (95%) tended to be CAM users. They usually had more impairment that required inpatient rehabilitation service. However, length of hospital stay was usually short and some degrees of impairments/disabilities remained at discharge which might not meet stroke survivors' satisfaction. Therefore, they seek other treatments including CAM to improve their conditions. Moreover, a low monthly cost of CAM treatment may be one important factor for high prevalence of CAM users. Regarding healthcare insurance in Thailand, over 80% of participants in our study were under universal coverage and civil welfare schemes which provide free health services including TTM and acupuncture. And, this might be another reason of choosing CAM. Another aspect is that friends or relatives had more influence than doctors or health care providers in choosing CAM treatments. But considering about the potential growth of social media and internet, the social media and internet might have more roles in the future.

Complications from CAM used in our study were only minor such as bruise and edema. Bruise was most commonly found and corresponded with the most common CAM used, Thai massage and acupuncture. In addition, stroke survivors usually receive antiplatelet medication and minor trauma could cause bruise. However, the study did not explore about the cause of edema. And this should be the point of interest to explore more in future CAM research especially in patients with cardiac, renal and or hepatic impairment who are prone to develop edema.

There are limitations of this study. It was done in a university hospital; hence, the results might not be generalizable to stroke survivors in other regions of the country. Satisfaction in CAM was asked but how much improvement after receiving CAM was not explored.

In conclusion, the prevalence of CAM use among Thai stroke patients was about 40%. The most common types of CAM used were Thai massage, acupuncture, traditional Thai and Chinese herbs and medications. Significant

related factors of CAM use were spasticity and constipation. These problems should be considered as essential problems among stroke patients.

Disclosure

The authors report no conflicts of interest.

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References

1. International Health Policy Program Ministry of Public Health. Disability-adjusted life year: DALY. Bangkok: WVO officer of printing mill; 2554 BE [cited 2019 August 22]. Available from: <http://bodthai.net/download/%E0%B8%A3%E0%B8%B2%E0%B8%A2%E0%B8%87%E0%B8%B2%E0%B8%99%E0%B8%A0%E0%B8%B2%E0%B8%A3%E0%B8%B0%E0%B9%82%E0%B8%A3%E0%B8%84-2554/>.
2. Pandian JD, Liu M, Misbach J, Venketasubramanian N. Alternative therapies for stroke treatment in Asia. *Int J Stroke*. 2011;6:541-3.
3. Division of complementary and alternative medicine. Complementary and alternative medicine in Thailand [cited 2015 September 02]. Available from: <https://thaicam.go.th/%e0%b8%aa%e0%b8%96%e0%b8%b2%e0%b8%99%e0%b8%81%e0%b8%b2%e0%b8%a3%e0%b8%93%e0%b9%8c%e0%b8%81%e0%b8%b2%e0%b8%a3%e0%b9%81%e0%b8%9e%e0%b8%97%e0%b8%a2%e0%b9%8c%e0%b8%97%e0%b8%b2%e0%b8%87%e0%b9%80%e0%b8%a5/>.
4. World Health Organization. Traditional, complementary and integrative medicine [cited 2015 September 2]. Available from: <https://www.who.int/traditional-complementary-integrative-medicine/about/en/>.
5. Satientrat P. Situation of Thai traditional medicine in public health care facilities in Thailand. In: Patragat P, Junket R, editors. Report of Thai traditional medicine, folk medicine and alternative medicine year 2548-2550BE. Bangkok: Manas Film; 2007.
6. Kaeowichian N. Knowledge in caring for elderly stroke with traditional Thai medicine and alternative medicine. [cited 2015 September 14]. Available from: http://www.thaicam.go.th/index.php?option=com_content&view=category&id=102&Itemid=160.
7. Pandian JD, Toor G, Arora R, Kaur P, Dheeraj KV, Bhullar RS, et al. Complementary and alternative medicine treatments among stroke patients in India. *Top Stroke Rehabil*. 2012;19:384-94.
8. Blackmer J, Jefromova L. The use of alternative therapies in the Saskatchewan stroke rehabilitation population. *BMC Complement Altern Med*. 2002;2:7.
9. Shah SH, Engelhardt R, Ovbiagele B. Patterns of complementary and alternative medicine use among United States stroke survivors. *J Neurol Sci*. 2008;271:180-5.
10. Kadir AA, Hamid AH, Mohammad M. Pattern of complementary and alternative medicine use among Malaysian stroke survivors: A hospital-based prospective study. *J Tradit Complement Med*. 2015;5:157-60.
11. Shin YI, Yang CY, Joo MC, Lee SG, Kim JH, Lee MS. Patterns of using complementary and alternative medicine by stroke patients at two university hospitals in Korea. *Evid Based Complement Alternat Med*. 2008;5:231-5.
12. Doshi VS, Say JH, Young SH, Doraisamy P. Complications in stroke patients: a study carried out at the Rehabilitation Medicine Service, Changi General Hospital. *Singapore Med J*. 2003;44:643-52.
13. Otegbayo JA, Talabi OA, Akere A, Owolabi MO, Owolabi LF, Oguntoye OO. Gastrointestinal complications in stroke survivors. *Trop Gastroenterol*. 2006;27:127-30.
14. Bracci F, Badioli D, Pezzotti P, Scivoletto G, Fuoco U, Di Lucente L, et al. Chronic constipation in hemiplegic patients. *World J Gastroenterol*. 2007;13:3967-72.
15. Li J, Yuan M, Liu Y, Zhao Y, Wang J, Guo W. Incidence of constipation in stroke patients: a systematic review and meta-analysis. *Medicine (Baltimore)*. 2017;96:e7225.
16. Lin CJ, Hung JW, Cho CY, Tseng CY, Chen HY, Lin FC, et al. Post-stroke constipation in the rehabilitation ward: incidence, clinical course and associated factors. *Singapore Med J*. 2013;54:624-9.