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Activities of daily living performance in stroke survivors receiving services from the trained village health volunteers at Doi Lor Community Rehabilitation Center, Doi Lor District, Chiang Mai Province, Thailand

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ABSTRACT

Background: Stroke is a major health problem in Thailand. The majority of stroke survivors suffer a sequela of the disease such as muscle weakness, sensory deficits, visual problems, and perceptual and cognitive function disorders. All of these lead to poor performance in activities of daily living for those survivors. Community-based rehabilitation is considered a potential approach that promotes functional performance in stroke individuals.

Objectives: The purpose of the current study was to investigate the effectiveness of rehabilitation services provided by trained village health volunteers (VHVs) in activities of daily living performance for stroke patients.

Materials and methods: This study was a one-group pre-test and post-test research design. Eleven stroke subjects were recruited by purposive sampling from Doi Lor Community Rehabilitation Center in Chiang Mai Province. Their activities of daily living performance were compared before and after the treatment program. The instrument used was The Activities of Daily Living Assessment Tool. Statistics used were descriptive and included the Wilcoxon Signed Ranks Test.

Results: Results demonstrated that the basic activities of daily living performance in stroke participants increased significantly from pre-intervention to post-test (z=-2.223, p<0.05). Also, scores in the instrumental activities of daily living of these individuals increased from pre-test to post-test significantly (z=-2.805, p<0.05).

Conclusion: It was indicated that Doi Lor Community Rehabilitation Center run by trained VHVs could provide effective improvement in activities of daily living performance in stroke clients.

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Introduction

Stroke is a major health problem in Thailand. It is the leading cause of death. Stroke is also the leading cause of long-term disability in those who survive. In 2012, rates of stroke mortality were 30.7 per 100,000 people,[1] and this increased to 44.8 per 100,000 people in 2014,[2] and 47.8 per 100,000 people in 2017.[3] In 2011, the total recordable incident rate of stroke was 330.6 per 100,000 people, which in 2014 escalated to 352.3 per 100,000 people and 425.2 per 100,000 people in 2015.[3, 4] Approximately 90% of stroke victims suffer a sequela of stroke such as weakness of the muscles, sensory deficits, perceptual problems and cognitive dysfunction, visual disorders, dysphagia, and aphasia.[5-7] All of these lead to poor performance in activities of daily living for these individuals.

Rehabilitation services in Thailand occur mainly in institutional settings. Especially in major and general hospitals in urban areas, while less attention was paid to disabled persons living at home and out in the rural community, especially ones who live in remote rural areas.[8] It is a characteristic of Thai culture that family caregivers and relatives tend to help disabled persons under their care instead of encouraging individuals to be independent in life.[9] There are few numbers of occupational therapists in Thailand compared to the total population of individuals who need occupational therapy treatment, especially for those in rural areas. Telerehabilitation can be used as alternative treatment method for clients who live far from urban areas.[10] However, many Thai people who live in remote areas do not have communication devices and a lot of them cannot access the internet to receive treatment via telerehabilitation.

Local government organizations Such as Sub-district Administrative Organizations (SAO) and Sub-district municipalities in Thailand are permitted by the government to establish a community rehabilitation center(s) with their own budget. These sub-district-rehabilitation centers can facilitate basic treatment programs provided by village health volunteers (VHVs). These centers can also be a place to advocate the human rights of people with disabilities.[11] Therefore, some Sub-district Municipalities, and SAO, where the mayor, chief executive, and officers agree on the needs of people for rehabilitation in their areas, provide the funding to establish rehabilitation centers. However, the Thai government does not require these centers to hire health professionals such as occupational and physical therapists because of the limitations of budget in maintaining the continuum of rehabilitation services.

Doi Lor Sub-district at Doi Lor District, Chiang Mai Province in Thailand is located approximately 60 kilometers away from the Chiang Mai city area. There were 223 persons with disabilities in this Sub-district, among 12,227 of the total population, who desperately waited for rehabilitation outreach since there was only one physical therapist providing services for people with disabilities in the whole district.[12] Regarding limited financial support from the government, there was no occupational therapist working in Doi Lor District. The chief executive of Doi Lor SAO, officials and heads of the villages agreed together to set up the Rehabilitation Center in their own area and trained the village health volunteers (VHVs) to work as rehabilitation workers.

Researchers, for this study, were interested in the effectiveness of services run by the trained VHVs at Doi Lor Community Rehabilitation Center in terms of functional performance for stroke survivors. Specifically, this study aimed to explore the effectiveness of rehabilitation services run by the trained VHVs on activities of daily living performance in stroke clients.

Materials and methods

Study design

This study was a single group, pre-test and post-test research design. It was comparing the activities of daily living performance of stroke clients before receiving services, from VHVs at Doi Lor Community Rehabilitation Center, and 8 weeks after receiving this intervention.

Participants

Sixteen stroke participants who received services at Doi Lor Community Rehabilitation Center in Chiang Mai Province, Thailand, were selected using purposive sampling. After the Community Rehabilitation Center agreed to participate in this research project, the principal investigator recruited participants corresponding to the inclusion and exclusion criteria.

All participants were required to meet the following inclusion criteria: 1) first stroke incident 2) the first admission to the center, 3) stable medical symptoms, 4) age between 20 and 80 years, 5) were able to participate in the program for one and a half hours each time, twice a week, for 8 consecutive weeks, and 6) could follow a three-part command. Participants were excluded if they: 1) had aphasia, and 2) participated in rehabilitation programs from other institutes at the same time as this study. The withdrawal criterion was the stroke survivors who participated less than 80 percent of the whole program.

All of the participants were informed about the procedure of the research project and each of them signed a consent form prior to starting the study.

Instruments

The Activities of Daily Living Assessment Tool (ADL–AT)

This instrument was developed by Apichai et al.[13] to provide a measure of ability on activities of daily living in stroke patients. This included both basic activities of daily living (BADL) and instrumental activities of daily living (IADL). Scores were measured by rating scales ranging from 1 to 5; 1 referring to dependence, 2 referring to maximal assistance, 3 referring to moderate assistance, 4 referring to minimal assistance, and 5 referring to independence with or without supervision. The BADL in this test is divided into 3 aspects consisting of self-care activities, functional mobility, and sexual expression. There are 23 items in the complete BADL. Possible scores in the BADL range from 23 to 115. There are 12 items in the IADL e.g. care of others, child-rearing, care of pets, communication management, community mobility, financial management, etc. Possible scores in the IADL range from 12 to 60. The total scores of this instrument range from 35 to 175. The items that are not applicable to measure can be

marked as "not applicable or N/A." The whole scores are calculated in percentage to determine the level of activities of daily living performance. The higher percentage scored demonstrates the higher performance of activities of daily living performance. Psychometric property of the ADL-AT in Thai stroke patients has shown an excellent inter-rater and test-retest reliability (ICC=0.98, 0.93, respectively). The analysis of Cronbach's alpha coefficient revealed high internal consistency (α=0.88). In addition, this tool displayed a positive correlation with Barthel index (r=0.90; p<0.001). In known-groups validity, stroke patients obtained lower ADL–AT scores compared to normal subjects (p<0.001).[13]

The VHVs in Thailand: Roles and Responsibilities

VHVs are considered the hallmark of community health care in Thailand.[14] They have contributed to a broad range of health promotion and health prevention activities in the country. In 2010 there were approximately 800,000 active volunteers, covering over 12 million households 15 and this number increased to 1,040,000 in the year 2020 throughout every Province in Thailand.[16] In the beginning, village health volunteers were chosen by local officials and given primary-care training to fulfill the mission of creating good change in the healthcare sector, propagating knowledge, coordinating for healthcare-development activities, and providing public health services. The initial training is 43 hours of classroom work and 15 days of specialized on-the-job training in health promotion, infectious disease surveillance and control, consumer protection, as well as traditional health knowledge. Following this training, each VHV is responsible for 10 households on average in their community. They assist the local health workers in promoting health and preventing diseases as well as in providing basic health services to local communities. The VHVs are supervised by on-site local health workers or public health officials.[17] At present, public health problems such as malnutrition and consumer health problems are continuously decreasing in Thailand,[18, 19] and the VHVs are encouraged to focus their duty in areas of prevention and management of chronic diseases.

Doi Lor Community Rehabilitation Center, Chiang Mai Province, Thailand

Doi Lor Community Rehabilitation Center was established with the funding of Doi Lor SAO who financial support from the Thai government. This established center aims to provide health promotion and basic rehabilitation to people with disabilities and the elderly in their own area.[20] Doi Lor Community Rehabilitation Center provides free transportation for clients. Caregivers do not need to take care of stroke survivors under their care on the day that stroke clients come to receive services at the Rehabilitation Center, so caregivers can take a rest or do another work as they prefer. There are four trained VHVs who provide services from 9 am to 4 pm, 2 days a week, on Tuesday and Friday.

Stroke Rehabilitation Education for the VHVS at Doi Lor Rehabilitation Center

There were 30 VHVs from 26 villages in Doi Lor Sub-district who applied to attend a stroke rehabilitation education program. The research team (five occupational therapists and five physical therapists) conducted stroke rehabilitation education for two and a half days including both theory and practice in the sessions. There were 4 topics of stroke rehabilitation provided for the VHVs in this study. These were comprising of 1) fundamental knowledge of stroke, 2) physical exercise and gait training for stroke, 3) upper extremity function training, and 4) ADL performance in stroke survivors. The topic of "fundamental knowledge of stroke," covered etiology, risk factors, physical symptoms, motor recovery, medical management, and possible complications. This was conducted on the first day between 9 am and 12 pm by the occupational therapists. The topic of "physical exercise and gait training for stroke" was conducted by physical therapists on the second day. This covered therapeutic exercise, walking gait and gait pattern, walking training, and postural control. The theory session was in the morning, and went from 9 am to 12 pm, then took a one-hour break for lunch from 12 pm to 1 pm. The practice session on "physical exercise and gait training for stroke" was conducted in the afternoon and went from 1 pm to 5 pm. In this session, 5 medically stable stroke survivors who lived in Doi Lor Sub-district were invited to be subjects for the VHVs in the training room. The trainers included five physical therapists. Each trainer was responsible for 6 VHVs in order to encourage more participation and discussion within the group. Therefore, a group of 6 VHVs each had one stroke subject. The topics of "upper extremity function training" and "ADL performance in stroke survivors" were conducted by occupational therapists on the third day. The theory session was in the morning and went from 9 am to 12 pm. The upper extremity function training emphasized general movement of the arm and hand, consist of reaching out for, holding, carrying, and releasing objects. The ADL performance in stroke survivors emphasized both BADL such as self-care, bed mobility, transferring, locomotion, sexual expression, and IADL such as care of pets, communication management, community mobility, meal preparation and clean up. All audiences took one hour break for lunch between 12 pm and 1 pm. The practice session on "upper extremity function training" and "ADL performance in stroke survivors" conducted in the afternoon went from 1 pm to 5 pm. In this session, the same 5 medically stable stroke subjects who participated in the practice program on the previous day were invited again to join the training session of upper extremity function and ADL performance in stroke at the meeting venue. The trainers in this session were five occupational therapists. Each trainer was responsible for 6 VHVs and a group of 6 VHVs each had one stroke subject.

In the rehabilitation education program for the VHVs, both occupational and physical therapists distributed a manual for stroke rehabilitation to all VHVs.The manual provided information concerning stroke comprising of epidemiology, causes and risk factors, types of stroke, physical symptoms, and treatment modalities. It illustrated rehabilitation for stroke patients such as ADL training, active and passive range of motion movement, therapeutic exercise, locomotion and walking training, upper extremity function practice programs, and the modification of home environment. The manual demonstrated precise definitions, clear color pictures, concise explanations, and wording in texts that were easily understood

by people who were not in the medical field. The VHVs were motivated to use this manual both in the theory and the practice sessions. In order to promote easy understanding in the training program, the trainers, who were occupational and physical therapists, provided a mostly structured training program to the VHVs so that they could quickly understand and easily apply the therapeutic treatment methods to use with those with stroke.

After the rehabilitation education, all VHVs took a paper examination concerning the theory and practice skills they had learned. Only the top 4 rankings among 30 VHVs were recruited to be rehabilitation workers at Doi Lor Community Rehabilitation Center. All these 4 VHVs provided rehabilitation services to stroke clients one week after finishing the training program. Prior to providing treatment to each client, occupational and physical therapists demonstrated how to evaluate and train stroke survivors in front of the 4 VHVs case by case, so that they could perform the treatment by themselves easily soon after. The occupational and the physical therapists in the research team visited Doi Lor Rehabilitation Center once every two weeks, for a period of 8 weeks, to give more guidance to the 4 VHVs if there were any questions.

Procedure

The process of the research project was conducted step by step as follows: 1) After the ethics approval, the principal investigator contacted the chief executive and officials at Doi Lor SAO to ask for permission to provide stroke rehabilitation education for the VHVs, 2) The education program was held at Doi Lor SAO near to the home of the VHVs, 3) After the completion of rehabilitation education, the research team selected the top 4 VHVs, who received higher test scores than the rest, to be health providers at the Rehabilitation Center, 4) The research team made contact with the director of the Sub-district Health Promotion Hospitals in Doi Lor area to ask for permission to access statistics, name's list, and addresses of stroke survivors, 5) The research team made appointments with the VHVs in the villages to visit the houses of stroke survivors under their care. They screened these patients correspondingly with the inclusion and exclusion criteria and invited them into the research project, 6) All subjects signed the consent form prior to receiving services at the Community Rehabilitation Center, 7) Four trained VHVs provided rehabilitation for stroke subjects for a period of 8 weeks, twice a week, one and a half hours each time, 8) Data collection was performed by 2 trained research assistants (RA), one collected data 7 days before intervention and the other collected data within 7 days after the program completion, 9) During the 8-weeks that services were provided, the research team, including occupational and physical therapists, visited Doi Lor Rehabilitation Center once every two weeks to offer advice to the 4 trained VHVs regarding any obstacles.

Data Collection

Data collection was conducted by 2 trained RAs who were not aware of the study's goal and were not involved in the rehabilitation education program. The principal investigator and the research team screened stroke subjects in accordance with the inclusion and exclusion criteria and notified the first RA, who was an occupational therapist, to collect data within 7 days before intervention at the Rehabilitation Center. Data collection was conducted by actual performance testing in the BADL and interviewing in the IADL. After 8 weeks of intervention, the principal investigator notified the other RA to collect data at post-test within 7 days following program completion at the Rehabilitation Center. The data collection procedure was the same between pre-test and post-test.

Statistical Analysis

Demographic characteristics of stroke participants were calculated using descriptive statistics. The comparisons of outcome variables at pre and post intervention were analyzed using the Wilcoxon Signed Ranks Test. The level of statistical significance was set at 0.05.

Results

There were 16 stroke participants recruited into the study. However, 5 of them could participate less than 80 percent in the whole program. Therefore, only 11 subjects were eligible for data analysis. All results were captured in tabular format as follows.

The analysis of sociodemographic data in 11 stroke survivors demonstrated that the majority of the participants were male and most of them finished elementary school. Almost all of the participants had right hemiplegia with the diagnosis of hemorrhagic stroke (Table 1).

The results also indicated that scores for BADL and IADL in stroke participants at post-intervention were significantly higher than those at pre-test (p<0.05), as shown in Table 2.

Table 1 Sociodemographic data of stroke participants. (n=11).

Sociodemographic data	Variables	Numbers (percentage)
Gender	Male	8 (72.70)
	Female	3 (27.30)
Age (years)	41-50	4 (36.30)
	51-60	3 (27.30)
	61-70	3 (27.30)
	71-80	1 (9.10)
Marital status	Single	3 (27.30)
	Married	6 (54.50)
	Divorced	2 (18.20)
Educational level	Elementary school	8 (72.70)
	Secondary school	3 (27.30)
Affected side	Left hemiplegia	3 (27.30)
	Right hemiplegia	8 (72.70)
Diagnosis	Hemorrhagic stroke	8 (72.70)
	Thrombotic stroke	1 (9.10)
	Embolic stroke	2 (18.20)
Time length since onset	<1 year	2 (18.20)
	1-2 years	4 (36.30)
	>2 years	5 (45.50)

Table 2 Comparison of activities of daily living performance: BADL and IADL in stroke participants at pre and post intervention. (n=11).

Variables		Mean (SD)	Mean rank	Z	Sig. (2-tailed)
1. BADL	Post-test	75.50 (21.17)	8.00	-2.22	0.026*
	Pretest	67.41 (23.31)	5.80		
2. IADL	Post-test	51.64 (23.02)	0.00	-2.81	0.005*
	Pretest	39.09 (16.13)	5.50		

*$p<0.05$

Discussion

Activities of Daily Living Performance

Activities of daily living performance in the present study measured both the BADL and the IADL. Results indicated that the BADL performance in stroke participants increased significantly from pre-intervention to post–test ($z=-2.22$, $p<0.05$). Likewise, scores in the IADL of these individuals increased from pre-test to post–test significantly ($z=-2.81$, $p<0.05$).

The BADL components consist of fundamental daily activities such as eating, dressing, grooming, personal hygiene, toileting, bathing, bed mobility, transferring and locomotion, etc. Many of these activities can be easily performed with one hand if those with stroke receive appropriate advice from the health care providers. Samples of activities that can be accomplished by one hand e.g. eating activity, drinking from a glass, teeth brushing, and grooming. Some of the stroke participants in the present study do not have the opportunity to act by themselves, instead, their caregivers assist them throughout the day within reason, due to time constraints. Scoring for the ADL–AT used in this study began at zero for the ones who could or would not perform activities by themselves. In contrast, when these stroke survivors received advice and the training program from the VHVs, they learned how to do these activities independently and the score for functional performance changed from zero to five.

The components in the IADL comprised care of others, child-rearing, care of pets, communication management, community mobility, meal preparation and clean up, for example. The trained VHVs who work at the Community Rehabilitation Center applied their knowledge received from occupational and physical therapists to advise stroke clients in performing these activities successfully. For example, the VHVs suggested meal preparation using a one-hand cutting board and taught individuals with stroke to use a smartphone

for communication. All these techniques promoted higher functional performance in stroke clients who received services at Doi Lor Rehabilitation Center. Consistent with a study of Chinchai, Jindakham, Apichai[21] who investigated the BADL function in 25 stroke participants who received services from the trained VHVs at four Community Rehabilitation Centers in Chiang Mai Province. Results demonstrated that stroke participants improved their functional abilities at three months post-intervention compared to pre-test abilities significantly (p<0.05). Congruent with a study of Park and Lee[22] who examined the effects of the community-based rehabilitation program in 11 chronic stroke patients. Results demonstrated that subjects who received the community-based rehabilitation program ten times in ten months improved activities of daily living performance significantly (p<0.05). Compatible with a study by Ru, et al.,[23] who explored the effectiveness of community-based rehabilitation on daily activities of stroke patients in Beijing, China. There were 50,000 stroke survivors who participated in the study, divided into 2 groups based upon which community the participants lived in. One was the experimental group where stroke participants received rehabilitation intervention from health professionals, the other was the control group where there was no special health service from the research team. Results revealed that stroke survivors in the intervention group increased their function in daily activities significantly (p<0.05) compared to the control group. Results of the present study were also supported by a study of Chinchai, Sirisatayawong, Jindakum[24] who investigated community integration in terms of home integration, social integration, and productive activities in 25 stroke subjects who received a 3-month rehabilitation service from the trained VHVs in Thailand. Results revealed that activities of daily living skills, as part of the home integration section, in stroke participants increased significantly after the intervention program (p<0.05).

Limitations

The present study was a one-group pre-test and post-test research design. There was no control stroke participant for the comparison of outcome variables and this could be a limitation of this study. Researchers, therefore, set the inclusion criteria to gather stroke clients with as much homogeneity among the subjects as possible. The study also used different research assistants, who were unaware of the study's goal, for collecting data before and after the intervention program in order to enhance the reliability of the research project. However, it is recommended that the inclusion of a control subject should be considered for future study. Another limitation in the present study were the small numbers of the participants. Therefore, its results may not be generalizable to the population of stroke survivors who received services from other Community Rehabilitation Centers. In further study, the larger sample size should be considered.

Conclusion

The study of activities of daily living performance in stroke clients who received services from the trained VHVs at Doi Lor Community Rehabilitation Center, Doi Lor District, Chiang Mai Province, demonstrated that participants with stroke had significantly improved activities of daily living performance after an intervention (p<0.05). The results suggested that rehabilitation services provided by the trained VHVs at the Community Rehabilitation Center that was established by the Sub-district administrative organization was helpful for functional performance in stroke clients.

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Conflict of interest

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the paper.

Ethics approval

The research project was approved by the Ethics Committee, Faculty of Associated Medical Sciences, Chiang Mai University, Thailand. Project number: AMSEC–63EX–027, ethics clearance number: 289/2563.

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