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Community rehabilitation by the trained village health volunteers on activities of daily living and quality of life in stroke survivors

Pisak Chinchai[1*] Siriphan Kongsawasdi[2] Pornpen Sirisatayawong[1] Sopida Apichai[1] Busaba Chuatrakoon[2] Nipaporn Thonglorm[2]

[1]Department of Occupational Therapy, Faculty of Associated Medical Sciences, Chiang Mai University, Chiang Mai Province, Thailand.
[2]Department of Physical Therapy, Faculty of Associated Medical Sciences, Chiang Mai University, Chiang Mai Province, Thailand.

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ABSTRACT

Background: The number of people with disabilities resulting from strokes is increasing in Thailand. The major sequela of the disease was weakness in one side of the body that causes difficulty in activities of daily living (ADL) and poor quality of life (QOL) for stroke survivors. Community-based rehabilitation could be one of the strategies that enhances functional performance and improves QOL in these individuals. There were many disabled people in Mae Ka subdistrict, San Pa Tong District, Chiang Mai Province, where health care providers and local people were enthusiastic to take care of each other's health in the community.

Objective: The present study aimed to investigate rehabilitation outcomes in ADL and QOL of stroke participants who received rehabilitation services from trained village health volunteers (VHVs).

Materials and methods: This study was a quasi-experimental research design. Subjects were recruited using purposive sampling, including 10 stroke survivors. Instruments used were 1) ADL Assessment for Occupational Therapy Clients; and 2) World Health Organization Quality of Life Assessment, Short Form-Thai version. The statistics used were descriptive, as well as the Wilcoxon Signed Ranks Test.

Results: Results demonstrated that scores of basic activities of daily living (BADL) in the participants increased significantly (p<0.05) except for sexual expression. The score in the instrumental activities of daily living (IADL) was also significantly higher at post-rehabilitation than pre-intervention (p<0.05), as was the total ADL score. Stroke patients had significantly higher QOL scores after intervention than the pretest (p<0.05).

Conclusion: These indicated that the community rehabilitation center at Mae Ka Subdistrict Administrative Organization, San Pa Tong District, Chiang Mai Province, run by the trained VHVs could promote ability in daily activities and improve QOL in stroke participants who come for their services.

Introduction

Stroke is the leading cause of death and long-term disability in those who survive.[1,2] In 2012, stroke mortality was 30.7 per 100,000 people in Thailand,[3] and this increased to 44.8 in 2014, 47.8 in 2017, and 52.8 in 2020.[3-5] In 2016, the total recorded incident rate of stroke was 451.4 per 100,000 people, which increased to 467.5 in 2017, 506.2 in 2018, and 542.54 in 2019.[4] Approximately 90% of stroke victims suffer from the sequelae of stroke, mainly weakness of the muscles and sensory deficits on the affected side, problems with uncontrolled muscle spasms, perception and cognition disorders, blurry or double vision, problems with chewing and swallowing

∗ **Corresponding contributor.**
Author's Address: *Department of Occupational Therapy, Faculty of Associated Medical Sciences, Chiang Mai University, Chiang Mai Province, Thailand.*
E-mail address: pisak.c@cmu.ac.th
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(dysphagia), etc. which resulted in these disabled people lacking the ability to do various activities in daily life, and many have to depend on others and have a poor quality of life.[6-8]

After the stroke, it has a significant impact on daily life activities for those who survive. Activities of daily living (ADL) are generally divided into two aspects.[9] One is the basic activities of daily living (BADL), which refer to daily routine activities that people perform regularly in their everyday lives.[9,10] The other is instrumental activities of daily living (IADL), which refer to activities that are more complex than the BADL and mostly require the use of equipment or tools to accomplish the tasks.[11] Walker, Leonardi-Bee, Bath, Langhorne, Dewey, Corr, *et al*.[12] found in their study of the data meta-analysis of community occupational therapy (OT) for stroke individuals that community OT significantly improved personal ADL (e.g., dressing, washing, feeding) and extended ADL (walking, domestic skills, leisure). Park, and Lee found in their study of the effects of community-based rehabilitation on ADL in chronic stroke survivors that the program improved ADL performance significantly.[13] Lee, Lee, Choi, and Pyun found in their study of community integration and QOL in aphasia after a stroke that score of QOL significantly correlated with ADL performance, which indicated that enhancement of ADL abilities could promote QOL of these individuals.[14]

For those unable to do daily activities by themselves, it may cause a poor quality of life. Hopman, and Verner noted in their study of QOL in 85 stroke patients at 6 months post-discharge from hospital without community rehabilitation that 5 of the 8 domains in QOL in these survivors, as measured by the SF-36, declined significantly.[15] The term quality of life has many definitions. This can be summarized as the level of satisfaction that has been met in terms of physical, mental, social, and various goal achievements in life.[16]

In Thailand, rehabilitation services are mostly still in hospital institutes, while those with permanent paralysis or various chronic diseases still require continuous care even when returning to the home.[17] Today, many communities are health conscious. There has been an effort by people in the community to help each other take care of each other's health in their localities. Personnel who play an essential role in this group are village health volunteers (VHVs). Some communities, led by local organizations such as subdistrict municipalities and subdistrict administrative organizations (SAOs), have set up rehabilitation centers in their localities to provide health care and essential rehabilitation for people with disabilities in the community. The VHVs, trained by medical personnel such as occupational therapists (OTs) and physical therapists (PTs), are providers of care for service recipients in the community. According to the Act Promotion and Development of Quality of Life for Persons with Disabilities, B.E. 2007, Section 20/3, local government units are allowed to establish service centers for persons with disabilities with their own budget.[18] A previous similar study to this research project was conducted by Chinchai, Sirisatayawong, and Jindakum, who investigated community integration and QOL of stroke survivors who received rehabilitation from the trained VHVs twice a week for 12 weeks (a total of 24 times) in four community rehabilitation centers, revealed that stroke participants had better community integration skills and QOL at the posttest than the pretest.[19] However, it is not easy for stroke individuals and family caregivers who live in the community to prepare themselves to come for services as many as twice a week. A lower frequency of services, for example, once a week, could be an alternative that may encourage more participation from these groups of people.

Mae Ka SAO, San Pa Tong District, Chiang Mai Province, is classified as one of the SAOs, with administrators and personnel who are responsible for caring for the health and welfare of the people being very alert. There is an idea to open a rehabilitation center to care for disabled people in their area, with VHVs who have received training in basic rehabilitation from PTs and OTs as service providers. Mae Ka subdistrict has a total population of 7,258 people, divided into 3,473 men, 3,785 women (from a survey as of February 2014).[20] Of these, there are a total of 343 registered disabled people, most of whom are persons with physical and movement disabilities, which includes people who are disabled due to stroke.[20]

The researcher is therefore interested in such a rehabilitation center, with service providers being the trained VHVs who live in that community, and how this affects the ability to do daily activities and the QOL of stroke patients before and after receiving once a week of the service.

Materials and methods

Study Design

This study was a quasi-experimental research design that compared the ability to do daily activities and QOL of stroke participants before and three months after receiving services at the community rehabilitation center, Mae Ka SAO, San Pa Tong District, Chiang Mai Province.

Participants

Stroke patients who were residents of Mae Ka SAO, San Pa Tong District, Chiang Mai Province, came to receive treatment at the rehabilitation center at Mae Ka SAO from July 2022 to September 2022. There was a total of 16 stroke clients during this period.

The sample was selected using a purposive sampling method according to the inclusion criteria as follows:

1. Be a person who has been discharged from the hospital and at home for over 3 months. This is because we can only accept stroke recipients with stable medical symptoms to come to services at the community rehabilitation center. The medical doctor prescribed medicine to the patients around 2 to 3 months after discharge from the hospital until the subsequent follow-up to check if their physical condition was stable at home.
2. There are no complications that are obstacles or risk factors for rehabilitation activities, such as

uncontrolled high blood pressure, heart disease, pressure sores, etc.
3. Do not regularly receive rehabilitation services at other rehabilitation centers.
4. Be a person who can come to receive services at the rehabilitation center once a week, for 1.5 hours each time, for 12 weeks (a total of 12 times).
5. Willing to participate in the research.

From a total population of 16 stroke recipients, 12 were selected as a sample according to the inclusion criteria.

Withdrawal criteria

People who receive services at a community rehabilitation center less than 80 percent of the designated time (less than 10 times out of 12 times).

Instrument

Data was collected using a general socio-demographic questionnaire for people with disabilities. In addition, there are tools to collect data on study variables, including.

1. Activities of Daily Living (ADL) Assessment for Occupational Therapy Clients: It is a tool used to measure the ability to perform daily activities in people with disabilities, especially those suffering from stroke. This instrument was developed by Apichai, Chinchai, Dhippayom, and Munkhetvit.[21] This tool has Likert scales for scoring ability in each activity in five levels, ranked from 1 to 5, where 1 means unable to do activities independently or can do it yourself less than 25% (dependence), and 5 means able to do that activity normally, you can do it yourself with the help of equipment, or you can do it yourself but have someone to guide you. There are two main aspects of daily activities: 1) Basic activities of daily living (BADLs), divided into self-care, functional mobility, and sexual expression. There are 23 questions in this aspect of the test: 2) Instrumental activities of daily living (IADLs), daily routines that require the use of tools or equipment, which has 12 test questions in this aspect of daily routines. The total possible score on the test from both aspects ranges from 35 to 175 points. This instrument has been explored for its psychometric properties with 45 stroke survivors and 45 normal adults. The results found that this test had an inter-rater reliability value of 0.98 and an internal consistency value with the Cronbach's alpha coefficient of 0.88. The results of the known-groups validity test found that stroke participants demonstrated significantly lower scores than normal adults (p<0.001), indicating good construct validity of the instrument.[21]
2 World Health Organization Quality of Life Assessment, Short Form-Thai version (WHOQOL-BREF-THAI), which has been updated and translated into Thai by Mahatnirunkul, Tuntipivatanaskul, Pumpisanchai, Wongsuwan, and Ponmanajirungkul.[22] This tool has 26 items that cover four components of quality of life: the physical, the psychological, the social relationship, and the environmental aspects. There are 5 levels of scoring criteria based on Likert scales, arranged from 1 to 5. Questions with opposing meanings are scored in reverse. Possible scores are 26-130 points with the following criteria: 1) scores of 26-60 mean having a poor quality of life; 2) a score of 61–95 means having a moderate quality of life; and 3) a score of 96-130 means having a good quality of life.[22] The reliability of this tool, calculated by the Cronbach's alpha coefficient, was 0.8406, and its concurrent validity was 0.6515. The reliability of WHOQOL-BREF-THAI in patients with chronic diseases such as HIV/AIDS revealed that the Cronbach's alpha ranged from 0.61 to 0.81 across domains.[23] This tool can be used to measure an indicator of treatment or a health intervention program.[22] It can also be used to assess the changes in quality of life resulting from treatment.[22] In cases where the respondent is old and cannot read, data collection may be used in the interview format. In a pilot study for the reliability of this tool among 15 stroke survivors who lived in Chaing Mai province, the result, as determined by Cronbach's alpha coefficient, was 0.84.[24]

Procedure

1. Following the ethics approval from the Human Research Ethics Committee, Faculty of Associated Medical Sciences, Chiang Mai University, the main researcher contacted the mayor of Mae Ka SAO, San Pa Tong District, Chiang Mai Province, to request permission to use the SAO's rehabilitation center as a place to implement the rehabilitation program for people with disabilities and conduct research.
2. The researcher prepared rehabilitation training equipment for stroke participants: a walking rail and steps, a training bed, arm and hand training equipment, tables, and chairs for practicing activities, etc.
3. The researchers coordinated with the SAO and Subdistrict Health Promotion Hospital officials to make an appointment to organize a basic rehabilitation training program for the VHVs. In selecting the VHVs for the study, officials from Mae Ka's SAOs asked for the village headman's cooperation in posting invitation announcements at the village headman's house and making announcements using voice calls in the village to invite. We recruited two VHVs per village. As there are 14 villages in this subdistrict, 28 VHVs were accepted by those who applied first. After the program, there was a posttest of the knowledge and training skills of VHVs. The questions in the test were drawn from the 2-day training program

by the PTs and OTs who conducted the practice session. Those who pass the test could be able to become service providers at the rehabilitation center. Those who received better scores have a higher chance of being selected. The training took two days, as we believed it was sufficient for this group's basic rehabilitation knowledge and skills. In addition, the VHVs of this community have received one to two weeks of training in caring for bedridden patients and caring for people with disabilities, in general, every year. In the two days of the program, the first day was a presentation of theoretical knowledge, and the second was a practical training session, starting from 8:30 am. to 4:30 pm. each day. In the theory section, OT taught basic knowledge of stroke in terms of risk factors, causes, symptoms, consequences, stroke rehabilitation, and psychological support. In the practice session, OTs trained the VHVs on proper positioning (lying, sitting, and standing), hand function, and ADL techniques for stroke. PTs trained the VHVs in general exercise (passive and active), bed mobility, weight training, balance (sitting and standing), and walking with and without aids.

4. The researchers visited the homes of the stroke disabled together with VHVs to screen the samples according to the inclusion criteria and invited them to participate in this research project. Home visits were conducted in all 14 villages of the Mae Ka SAO.
5. The researchers and the officials at Mae Ka SAO selected 12 VHVs who passed the training exam, arranged in order of their test scores, to be service providers at the rehabilitation center. Services are provided weekly, Tuesday, and Friday, 9:00 am. To 12:00 pm., and there are two VHVs working each day. The researchers and team, who are OTs and PTs, were the people who assessed people with disabilities together with the VHVs and recommended individual treatment methods for the VHVs. The recommended treatment is essential rehabilitation with training methods according to a structured program where there is no or minimal risk of injury to the stroke participants. The VHVs can provide rehabilitation such as passive and active range of motion (ROM) to the joints, strengthening exercise to the muscles, functional movement of the affected extremity, walking locomotion, and ADL training, all upon the recommendation of the OTs and PTs. One VHV could take care of two to three disabled people each day. Each disabled person received rehabilitation for 12 weeks, once per week, for one hour and 30 minutes each time, for 12 times. Before every training session, VHVs measured blood pressure, checked the vital signs of all stroke participants, and asked about general physical symptoms. Medicines and first-aid equipment are prepared at the center. Mae Ka SAO's emergency vehicles are always available when rehabilitation services are being provided to service recipients.
6. A research assistant (RA), who is an occupational therapist (OT) with more than five years of experience working with stroke patients and does not know the research objectives, and who has been trained in using research tools, collected data on the study variables within seven days before the disabled person received rehabilitation. Data collection was conducted at the homes of disabled people. When the disabled person was uncomfortable participating in the data collection process at home, the RA made an appointment with stroke subjects to meet at the community rehabilitation center, where Mae Ka SAO vehicles pick up disabled people at convenient times during official hours. Data were collected again within seven days after the disabled person received 12 weeks of rehabilitation. To prevent differences in environmental conditions that may affect the study variables, for those with disabilities who first collected information at home, data collection will be conducted at home the second time. In the same way, disabled people initially received data collection at a community rehabilitation center. The second time, the data was collected at the rehabilitation center.
7. When the VHVs provided services to people with disabilities at the rehabilitation center, the researchers, both OTs and PTs, visited the work of the VHVs once every two weeks to see what they needed to help with. The VHVs could also immediately contact OTs and PTs via phone if they have a problem or want to ask about rehabilitation issues.

Data Analysis

Descriptive statistics for the demonstration of socio-demographic data in the sample. As the data in the study variables were not normally distributed, a Wilcoxon Signed Rank test was used to see differences in these variables before and after receiving the rehabilitation program. Statistical significance was set at $p<0.05$. The effect size (Cohen's d) was also calculated to demonstrate the practical significance of the study's findings. The intermediate or medium (d ranges from 0.45 to 0.75) and large effect sizes (d>0.75) were preferable as these indicate significant practical results from the experiment.[25]

Results

Of the 12 stroke participants selected according to the study criteria, two subjects were withdrawn due to participating in rehabilitation for less than 80 percent of the designated time. There was a total of 10 participants remaining in the research project. The results of the study can be shown as follows:

Data from Table 1 show that the majority (80%) of the sample were married, the level of education is mainly at the primary level, and almost all of them (80%) suffered

from stroke for more than two years. Data from Table 2 show that the sample's BADL ability in nearly all aspects and the total BADL, except sexual expression, improved significantly (p<0.05). Participants also significantly improved the IADL, as was the total ADL (p<0.05). Data from Table 3 show that every aspect of the sample's QOL, including the overall QOL, improved significantly (p<0.05).

Table 1. Socio-demographic information in stroke participants (N=10).

Variables		Number
Sex	Male	6
	Female	4
Age (year)	51-60	4
	61-70	3
	71-80	3
	Mean±SD = 64.60±10.68	
	Minimum = 51, Maximum = 80	
Marital status	Married	8
	Divorced	1
	Widowed	1
Education level	Elementary	8
	Secondary	1
	College/University	1
Body affected side	Left	6
	Right	4
Diagnosis	Hemorrhagic stroke	4
	Thrombotic stroke	3
	Embolic stroke	3
Time since onset (month)	<12	1
	13-24	1
	>24	8
Time since discharged from hospital (month)	<12	1
	13-24	1
	>24	8
Motor recovery (Brunnstrom stages)	3	4
	4	1
	5	5
Caregiver	Spouse	6
	Son/daughter	2
	Relatives	2

Table 2. Comparisons of the activities of daily living in stroke participants before and after receiving the rehabilitation program (N=10).

ADL			Median (Q3-Q1)	*p* value	Effect size
BADL**	Self-care	Pretest	92.9 (98.1-76.3)	0.012*	0.56
		Posttest	100 (100-86.3)		
	Bed mobility	Pretest	95.0 (100-88.8)	0.039*	0.46
		Posttest	100 (100-95.0)		
	Transferring	Pretest	45.7 (80.0-26.4)	0.018*	0.53
		Posttest	80.0 (88.9-45.7)		
	Locomotion	Pretest	80.0 (100-75.0)	0.020*	0.52
		Posttest	100 (100-87.5)		
	Sexual expression	Pretest	4.5 (5.0-2.5)	0.317	0.22
		Posttest	5.0 (5.0-2.5)		
	Total BADL	Pretest	77.9 (89.1-70.7)	0.008*	0.60
		Posttest	92.4 (95.8-75.4)		
IADL***	Total IADL	Pretest	48.2 (79.6-29.4)	0.012*	0.56
		Posttest	62.7 (87.4-30.0)		
Total ADL	BADL + IADL	Pretest	69.7 (86.2-62.2)	0.008*	0.60
		Posttest	85.6 (93.1-64.9)		

*Note: *statistically significant, **BADL stand for Basic activities of daily living, ***IADL stand for Instrumental activities of daily living*

Table 3. Comparisons of QOL in stroke participants before and after receiving the rehabilitation program (N=10).

QOL		Median (Q3-Q1)	*p* value	Effect size
Physical	Pretest	18.0 (24.0-15.0)	0.009*	0.58
	Posttest	22.0 (26.0-20.0)		
Mental	Pretest	19.0 (25.0-18.0)	0.024*	0.50
	Posttest	23.0 (24.0-20.0)		
Social relationship	Pretest	9.0 (10.0-7.0)	0.027*	0.50
	Posttest	10.0 (11.0-9.0)		
Environmental	Pretest	23.0 (25.0-22.0)	0.007*	0.60
	Posttest	28.0 (30.0-25.0)		
Total QOL	Pretest	74.0 (93.0-67.0)	0.008*	0.60
	Posttest	90.0 (96.0-82.0)		

*Note: *Statistically significant.*

Discussion

The results of the study can be discussed as follows:

Activities of daily living ability

The results of the present study found that almost every aspect of the sample's ability to do BADL and the total BADL, except sexual expression, improved significantly (p<0.05), with medium effect sizes (Table 2). The BADL includes self-care activities, bed mobility, transferring, wheelchair propelling, and walking locomotion. This is likely because rehabilitation service providers at Mae Ka community rehabilitation center are the VHVs who have been trained to have the ability to care for people with disabilities in these BADL. BADL is a preliminary activity that requires training for people with disabilities to engage to their potential. This is consistent with the study of Chinchai and Kongsawasdi[26,] who studied the ability to perform daily activities of 11 stroke survivors who received a rehabilitation program at the community rehabilitation center of Doi Lor SAO, Doi Lor District, Chiang Mai Province. The stroke participants in that study received twice a week of rehabilitation for 8 weeks, provided by the VHVs who have been trained in the basic rehabilitation program, and the results revealed that the stroke subjects had better ability in BADL. However, the essential daily routine of sexual expression in the present study has not changed significantly from before and after the program. This may be because, in the general social context of many places, sexual communication is still a subject that people still find shameful and sensitive,[27] especially in Asian countries, including Thailand. Therefore, disabled people themselves will avoid talking about sexual problems. Health professionals, themselves, are underprepared to address sexuality with stroke survivors and rarely provide information or ask about sexuality.[28,29] Moreover, service providers (VHVs) in the present study do not have adequate training or knowledge in this area to provide counseling to disabled people.

For the results of the ability to do IADL in the sample group, it was found to be significantly improved (p<0.05) with a medium effect size comparing before and after receiving the rehabilitation program (Table 2). This is likely because daily routines that use assistive devices in the IADL, such as caring for others, traveling within the community, shopping, cooking, washing utensils, taking care of one's own health, etc., are connected to the BADL. For example, when people with disabilities can perform walking locomotion better in the BADL, it will increase their abilities to travel around the community and do better shopping, etc. in the IADL. In addition, the trained VHVs who worked at the rehabilitation center provided rehabilitation and encouraged the clients to participate in household activities such as meal preparation and clean-up and community events such as religious and spiritual activities in their own community, which increased IADL performance. Congruence with a study by Chinchai, Sirisatayawong, and Jindakum, who investigated community integration, including household activities that are like those in the IDL, in stroke survivors that received rehabilitation from the trained VHVs in four community rehabilitation centers in Chiang Mai province, Thailand.[19] The study revealed that stroke participants had significantly better scores in household and community engagement at the posttest than the pretest.

The results of the present study also demonstrated that the ability to perform the overall ADL improved after receiving the rehabilitation program, the same as BADL and IADL. This is consistent with a study by Chinchai and Kongsawasdi, which explored the ability to perform daily activities of 11 stroke subjects who received a rehabilitation program at the community rehabilitation center of Doi Lor SAO, Doi Lor district, Chiang Mai province, twice a week for eight weeks, provided by the trained VHVs.[26] The results revealed that the stroke participants had better ability to perform the BADL, IADL, and overall ADL.

Quality of Life

The results of the study demonstrated that after receiving rehabilitation programs from the trained VHVs, the stroke patients' overall QOL and all its components (physical, psychological, social interactions, and the environment) significantly improved (p<0.05) with medium effect sizes (Table 3). Beside the rehabilitation programs that the VHVs provided to disabled people, which consist of general exercise, walking locomotion, wheelchair propelling, upper extremity function training, ADL practice, etc., the VHVs also provided advice on how to behave to take care of themselves at home, such as

taking medicine as prescribed by a doctor, taking care of cleanliness of the body, making simple home modification suggestions, e.g., making handrails in the bathroom, substituting a squat toilet with the flush toilet, etc. The VHVs also encouraged stroke recipients to participate in community and social activities. In addition, when disabled people come to receive services at the rehabilitation center in the community, they could meet with peers and talk or express their feelings, discuss, and exchange knowledge about treatment with each other, etc. All these processes are essential factors that result in the improvement of QOL. Consistent with the study of Chinchai, Kongsawasdi, Kapwang, and Chanchai on the QOL and community integration of 11 stroke subjects who receive rehabilitation services from the trained VHVs at the community rehabilitation centers for eight weeks, two times a week, one hour thirty minutes each time, which demonstrated that the overall QOL of the sample improved significantly (p<0.05).[30] In addition, when the ability to ADL increases in these people, it may be a factor that leads to good QOL. According to a study by Jönsson, Lindgren, Hallström, Norrving, and Lindgren[31] that examined QOL in 304 stroke survivors at four and 16 months after the onset, functional ability was a good predictor for improving QOL. Enhancement of functional performance in daily activities in stroke individuals could induce good QOL in these people.[32-35]

Limitations

Due to the small number of samples as we conducted a study in only one community rehabilitation center, it may not be appropriate to calculate the IADL on a per-area basis because in the IADL there are 12 assessment topics, and it is not necessary for patients to complete all activities in the IADL. Patients may do one or not complete another according to their ability and necessity. This is not like BADL, where every patient must complete all aspects of their daily lives. Another limitation of the study is that the time since onset for most subjects in the present study was above 12 months (Table 1). This meant that stroke survivors who attended rehabilitation in our research were chronic, as we recruited only participants with stable medical symptoms. A study in more acute cases may need health professionals such as PTs, OTs, etc., as these require complicated therapy and many physical precautions. Another concern is that the VHVs in the present study recognized that stroke participants under their care would be evaluated for functional ability and QOL after the rehabilitation, which might affect the study results. However, these VHVs did not know the objectives of the research project, and the researchers were not involved in promoting their work positions.

Conclusion

The ability to do BADL in almost all aspects, the total IADL, and the overall daily routine of ten stroke participants were significantly improved (p<0.05) after receiving rehabilitation practices from the trained VHVs for 12 weeks, once a week, for one hour and 30 minutes each time. Except for sexual expression in the BADL, that score has not changed from pretest to posttest. The QOL scores, which consist of physical, mental, social relationship, and environmental aspects, and the overall QOL in these stroke recipients were also significantly increased (p<0.05) comparing before and after receiving rehabilitation programs. All these indicate the advantages of services provided by the trained VHVs at the Mae Ka SAO rehabilitation center, San Pa Tong District, Chiang Mai Province, to the ADL and QOL of stroke survivors in the present study.

Conflicts of Interest

The authors declared no potential conflicts of interest concerning this article's research, authorship, and/or publication.

Ethical Approval

Ethical approval was obtained from the Human Research Ethics Committee, Faculty of Associated Medical Sciences, Chiang Mai University, Thailand; project number AMSEC-64EX-002; and the ethics clearance number 069/2564.

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