

# Development of a Physical Capacity Program for Training Stroke Patients with Hemiplegia

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**Abstract-** This study was an experimental research using a two-group pre-posttest aiming to develop a physical capacity program for stroke patients with hemiplegia. The samples consisted of stroke patients aged 40-69 years old who had lost physical capacity less than 6 months and had been treated from a hospital in Thailand. 64 patients were involved and assigned to a control or experimental group by using a simple random sampling technique. The experimental group received a physical capacity program for 12 months, while the control group received a routine rehabilitation program from the hospital. The program included training activities of daily living such as sitting on a wheel chair, walking, speaking, dressing, taking a bath and eating. Data were analyzed by using descriptive statistics, paired t-test and the analysis of covariance. The results revealed the levels of activities of daily living of the patients in the experimental group were significantly higher than those in the control group. The findings suggested stroke patients would gain benefits from the physical capacity program because they become more active in their rehabilitation. Nurses and other health care professionals in communities should further use the physical capacity program to continuously promote activities of daily living in stroke patients with hemiplegia.

**Index Terms-** Activities of Daily Living; Hemiplegia; Physical Capacity Program; Stroke

## I. INTRODUCTION

Stroke is a serious public health problem in worldwide due to high mortality and disability rates. In Thailand from 2005-2006, stroke was the third leading cause of death after heart disease and cancer respectively. [1] Hemiplegia is one of the most common disabilities resulting from stroke. It is the term used to describe the status of paralysis occurs on one side of the body opposite the side of the brain damaged by stroke, and may affect the face, an arm, a leg, or the entire side of the body. [2] The patients may have difficulties with everyday activities such as walking or grasping objects. Some patients may have problems with swallowing. [3] Many rehabilitation programs were designed to improve muscle strength of stroke patients at hospitals. [4-8] However, a few programs intended to develop physical capacity of stroke survivors in day to day lives. Time spending for physiotherapy at the hospital may not much enough for physical improvement. Those stroke patients need effective programs to advocate their physical capacities continuously at home. Thus, in order to fill the gap of knowledge on the rehabilitation programs for stroke patients, the present research study aimed to develop a physical capacity program for stroke patients with hemiplegia.

## II. REVIEW OF LITERATURE

Stroke is the symptom of the brain or nervous syndrome which can significantly interfere with the ability to perform daily activities. This occurring is caused by an obstruction or hemorrhage within the brain. [9] About 80% of stroke people have suffer from weakness on one side of their bodies, this condition is called hemiplegia [10] and found in persons age 40-60 years. [11] People with hemiplegia may have trouble moving their arms and legs, difficulty walking and may also experience a loss of balance. They may have problems of doing simple everyday activities like grabbing objects, dressing, eating, and using the bathroom. They may also have problems of talking and understanding what people say. [2] Rehabilitation should be start within 24 hours after the patients' medical conditions have been stabilized. Patients are prompted to change positions frequently while lying in bed and to engage in range-of-motion exercises to strengthen their stroke-impaired limbs. Rehabilitation should be an ongoing process to maintain skills of basic activities of daily living and the patients should receive the recovery within six months following the stroke. [12-13]

Most rehabilitation efforts are focused on muscle exercise and cardio respiratory fitness with a physical therapist at a hospital [4-8], while a few of efforts are spent on tasks associated with training the patients to perform everyday living such as getting dressed, taking a shower and using a rest room. The activities of daily living can increase stroke patients' abilities for common social interaction and enhance a profound positive psychological condition. [14] To achieve this tasks, several studies suggested health care professionals as well as family caregivers should together to provide emotional support these patients to perform activities of daily

living. [15-17] The patients need to be a maximize recovery and help them return to maximum independence. Time spending for rehabilitation must take too long and need continuously practice at home. [18] Recent research supported the idea of a best make of physical training in stroke patients can enhance abilities of a day-to-day life. [19-25] Nurses have their roles in rehabilitative care for patients, training a physical capacity program for stroke patients with hemiplegia would take benefits both physical and psychological condition for these patients. However, little has been found about this program, it is important to see the whether the program could increase physical capacity for these patients.

### III. RESEARCH ELABORATIONS

#### *A. Design*

This experimental research involved the use of two-group pre-post test. Data were obtained, at six months in time, via activities of daily living levels.

#### *B. Ethical Considerations*

Ethical approval was attained from an institute of review board of on human rights, prior to commencing the study. In addition, the leaders of the hospital, where data were gathered, also granted approval for the primary investigator (PI) to access potential samples. Potential samples were informed about: the study's purpose; what study participation would entail; voluntary participation; confidentiality and anonymity issues; the right to withdraw at any time without repercussions and participation not affecting their quality of, or access to, medical care or any other services at the hospital. Informed consent was obtained from each sample prior to his/her participation in the study.

#### *C. Setting*

The study took place in a rural village in central Thailand. Samples of the community generally were stay with their adult children during the day. Public transportation services were lacking, in the village, so residents relied on personal motorbikes/cars or friends/neighbors for transportation.

#### *D. Samples*

Potential samples consisted of Thais, registered a hospital, who were: diagnosed with stroke and hemiplegia less than 6 months; 40 years of age or older. Persons who appeared to have cognitive impairments were excluded from the study. Potential samples were identified and asked to participate in the study, by a registered nurse, at the hospital, who was aware of the study's purpose and inclusion criteria. The initial 64 potential participants, who volunteered and met the inclusion criteria, completed the study.

The same amount of samples participated in an experimental and control group ( $n = 32$ ). The samples were mostly male in experimental ( $n = 20$ ; 62.5%) and in control group ( $n = 18$ ; 56.3%); were between less than 50 to more than 69 years of age in both groups (mean = 61.7 years); and had an educational level of primary school ( $n = 20$ ; 62.5%). Majority of the experimental group demonstrated the right side of weakness ( $n = 17$ ; 53.1%) while the control group showed the same amount of left side weakness. Both group were typically having a muscle power of grad 4 in investigational ( $n = 13$ ; 40.6%) and the other group ( $n = 15$ ; 46.9%), and had no previous of hemiplegia in experimental ( $n = 26$ ; 81.3%) and control groups ( $n = 27$ ; 84.4%). The samples took a problem of hypertension in experimental ( $n = 25$ ; 78.1%) and the other ( $n = 24$ ; 75%). The caregivers in trial group were their couples ( $n = 14$ ; 43.8%) but children in controller ( $n = 16$ ; 50%), and they had no experience in taking care of stroke patients. Most members of both groups had a monthly income of 5000 to 10000 Baht [\$170 to \$340 USD] in an experimental ( $n = 11$ ; 34.4%) and the other group ( $n = 13$ ; 37.5%)

#### *E. Measurements*

In addition to the physical training being used to generate data were collected through use of three instruments. These included: a Demographic Data Questionnaire (DDQ); the Abilities of Daily Living Assessment (ADLA) [18]; and, the Physical Capacity Program (PCP). [18]

The PI-developed Demographic Data Questionnaire (DDQ) was used to determine each sample's: gender; age; educational level; side of weakness; muscle power; health problem; caregiver; caregiver experience in taking care; and, monthly household income.

The Abilities of Daily Living Assessment (ADLA) [18]; was used to measure the samples' of their abilities of daily living. The ADLA contained 14 items including: physical cleansing; dressing; wearing shoes, taking a bath, using a rest room, physical movement, going upstairs; eating, cooking; driving, cloth cleansing; house cleansing; shopping; and, calling a phone. All items were measured on a 5-point rating scale ranging from 1 = "need assistant" to 5 = "self-help." A total score was determined by summing scores across all items. Thus, scores on the ADLA could range from 14 to 70. Interpretations of the total score provided a measure of: low abilities of daily living [ADL] (14 to 31); moderate ADL (32 to 49); and, high ADL (50 to 70). [18] The content validity of the

ADL previously was determined by education experts. [18] The instrument’s internal consistency reliability, in this study, was found to be 0.83.

The Physical Capacity Program (PCP) [18] was used to train samples’ physical capacity to perform ADL. The PCP was captured by 7 sequences: adjusting a position of lying and sitting in bed and wheelchair; moving joints, body moving; standing; walking; speaking; and, doing ADL. Each capacity was measured by the ADLA. Content validity of the PCP was assessed, prior to use in the study, by five experts in cardiovascular disease, physical therapist and community health nursing. The experts assessed the average content validity index (CVI) to be 0.96. The internal consistency reliability of the instrument, in this study, was found to be 0.91.

*F. Procedure*

One month prior to the start of the study, each sample was administered the: DDQ and ADLA. The questionnaires were administered, individually, to each sample in a hospital. During the 12-month physical training process, each sample’s ADL level was assessed, during his/her weekly healthcare appointment, by the nurses. The PI retrieved each sample’s ADL values from the respective health records, prior to training session. During the middle and last physical training session, each sample again was administered the ADL.

*G. Data analysis*

Descriptive statistics were used to assess the samples’ demographic characteristics and calculate their scores on the ADL. A paired-samples t-test (the assumption of normality was tested to be reasonable before analysis) was used to compare, before and after participation in the PCP and the samples’ ADL scores. The analysis of covariance (ANCOVA) was used to evaluate the difference of ADL between the experimental and control group.

**IV. RESULTS**

As noted in Table 1, after 12 months of taking part in the PCP sessions, the samples’ ADL scores significantly increased; compared to their ADL scores prior to participating in the PCP sessions. In addition, the mean scores of ADL at the 1-month period influenced the mean score of ADL at the 12-month dated with significantly increased compared to their ADL levels prior to taking part in the PCP sessions (Table 2).

Table 1: ADL scores after participation in the PCP

| Paired Differences | Month 1 <sup>st</sup> |       | Month 6 <sup>th</sup> |       | Month 12 <sup>th</sup> |       | t     | P-Value |
|--------------------|-----------------------|-------|-----------------------|-------|------------------------|-------|-------|---------|
|                    | Mean                  | S.D.  | Mean                  | S.D.  | Mean                   | S.D.  |       |         |
| Experimental group | 19.53                 | 13.35 | 22.94                 | 11.95 | 55.31                  | 12.65 | 12.15 | .000*   |
| Control group      | 17.80                 | 17.50 | 21.72                 | 18.87 | 39.31                  | 14.29 | 6.84  | .000*   |

\*p < .01

Table 2: ANCOVA in the mean scores after participation in the PCP

| Source        | df | SS          | MS         | F-Test  | P-Value |
|---------------|----|-------------|------------|---------|---------|
| Covariate     | 1  | 345439.527  | 345439.527 | 149.479 | .000*   |
| Between group | 1  | 55515.182   | 55515.182  | 24.023  | .000*   |
| Within group  | 61 | 140968.537  | 2310.960   |         |         |
| Total         | 64 | 5500662.040 |            |         |         |

\*p < .01

**V. CONCLUSIONS**

Taking part in the PCP was beneficial for enhancement of samples’ ADL. This finding is consistent with prior studies wherein a physical training in stroke patients can enhance abilities of a day-to-day life. [19-25] As revealed, the findings showed an improvement in the physical capacity of stroke patients with hemiparesis in the experimental group. This may be due to several beneficial physiological changes according to the fact that the PCP helps increasing muscular strength. Joints became more flexible thus improve motivation, body balance. [26-27] These findings further support the contention that use of the PCP to improve ADL is beneficial for stroke patients with hemiplegia. The positive findings demonstrated the PCP can serve as a form of mutual aid for the

purpose of improving the ADL of stroke patients with hemiplegia. Thus, establishing PCP in communal settings, for the purpose of fostering ADL stroke patients, is recommended. Future studies need to consider developing and accessing the effectiveness of PCP for stroke patients with hemiplegia that: include more female samples; are implemented in other areas of Thailand; include variables not addressed in this study that potentially could influence ADL.

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