



Original Article

Grip strength in post-stroke hemiplegia

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Abstract. [Purpose] This study was performed in order to investigate the grip strength of the unaffected hand of hemiplegic post-stroke patients. [Subjects] This study conducted on 83 hemiplegic post-stroke patients from May to August 2012. [Methods] This study was measured the mean grip strength of the unaffected hand of patients with hemiplegia and comparatively analyzed this with the mean normal grip strength. [Results] The grip strength of the unaffected hand of patients with hemiplegia was weaker compared to the of normal. [Conclusion] Patients with hemiplegia demonstrated problems in both their unaffected and affected sides. Based on the results of this study, it is necessary to expand treatment from the affected to unaffected areas of patients with hemiplegia.

Key words: Affected side, Grip strength, Hemiplegia

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INTRODUCTION

Stroke is a common neurological disease and a leading cause of chronic disability worldwide¹⁾. It often causes hemiplegia, which is accompanied by several complications including motor, perceptive and cognitive, and sensory abnormalities, as well as language disorders, and visual impairments²⁾. The deterioration of motor skills due to hemiplegia is a major factor in the reduction of the activities of daily living and socialization³⁾.

Eighty-five percent of stroke patients show upper limb disorders in the acute stage⁴⁾. After 3–6 months between 55–75% of post-stroke patients reported persistent upper limb⁵⁾. Upper limb dysfunction is the biggest reasons for limitations in the daily activities of post-stroke patients⁶⁾.

The movement limitations from the permanently affected upper limb make difficult for the post-stroke patients to lead normal lives⁷⁾. Hemiplegia makes functional use of the affected upper limb for performing activities of daily living difficult⁸⁾. For this reason, improvements in the upper limb motor ability of post-stroke patients that enable the performance of the independent activities of daily living are discussed in the rehabilitation process. The importance of the upper limb functions should be emphasized in the function improvement programs of the rehabilitation treatment⁹⁾.

Upper limb functional recovery of stroke patients appears slower than that of the lower limb¹⁰⁾. Studies on the upper limb function of stroke patients are limited to the affected side and rehabilitation programs focus on improving the function of the affected side¹¹⁾. In reality, there are no studies on the post-stroke function of the affected hands. Thus, this study was conducted to determine the grip power and strength of the unaffected area of patients with hemiplegia.

SUBJECTS AND METHODS

This study was conducted between June 1, 2012 and August 31, 2012, and involved 83 post-stroke Korean patients with hemiplegia as subjects. The purpose and methods of the study were explained to the participants before their inclusion in the

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study. Informed consents were taken according to the principles of the Declaration of Helsinki.

The grip strength was measured by using the Jamar Hydraulic Hand Dynamometer (Preston, USA). The appropriate posture when measuring grip strength was presented by the American Society of Hand Therapists (ASHT) and the grip strength of the unaffected hand of the subject was measured by adducting the shoulder joint, bending the elbow joint by 90° and placing the lower arm and wrist joint in the middle, and the average value after 3 measurements was recorded. Data on the normal grip power of Korean adults were collected and analyzed according to age using the paired t-test SPSS software version 18.0 and the significance level was set to 0.01.

RESULTS

There were 51 (61.40%) male and, 32 (38.60%) female patients in this study with an average age of 57.59 and 69.16 year, respectively (Table 1). The grip strength of the unaffected side of patients with hemiplegia was significantly lower compared to that of the patients in the normal control group ($p<0.01$) (Table 2).

DISCUSSION

During dominant hand dysfunction due to stroke, the ability to participate in a variety of tasks is damaged and, stroke patients face difficulties in performing many tasks^{12, 13}. Thus, this study was performed in order to determine the grip strength of the unaffected side of patients with hemiplegia. According to previous research findings, the grip strength of the unaffected side of patients with hemiplegia was found to be significantly lower than that of people without hemiplegia. When performing activities of daily living, stroke patients mainly use the unaffected side and are only interested in the paralyzed side during rehabilitation assessment or treatment, and relatively neglect the evaluation and treatment of the unaffected side¹⁴. Despite problems with the function of the unaffected hand of patients with hemiplegia, clinical treatment only focuses on the affected side. Based on the results of this study, interventions that focus on the unaffected hand should be included during the treatment of patients with hemiplegia in clinical trials.

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Table 1. General characteristics of the study subjects (N=83)

| | | Subjects |
|---------------|--------|--------------|
| Gender | Male | 51 (61.4%) |
| | Female | 32 (38.6%) |
| Age (SD) | Male | 57.6 (±12.7) |
| | Female | 69.2 (±14.2) |
| Affected side | Left | 33 (39.8%) |
| | Right | 50 (60.2%) |

SD: standard deviation

Table 2. Comparison of grip strengths between the study group

| Affected side (N) | | Grip strength of the non-affected side | |
|-------------------|----------|--|--------------------------|
| | | Hemiplegia Mean±SD | Normal person Mean±SD |
| Male | Lt. (16) | 29.4± 11.9** | 40.2± 4.2 |
| | Rt. (35) | 27.6± 10.7** | 37.9± 5.5 |
| Female | Lt. (17) | 16.7± 10.2** | 22.4± 4.1 |
| | Rt. (15) | 13.0± 9.6** | 21.1± 3.9 |

Rt.: right side; Lt.: left side

**Significant difference $p<0.01$

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