



Original Article

Differences in body awareness and its effects on balance function and independence in activities of daily living for stroke

SI-NAE AHN, PhD, OT¹⁾

¹⁾ Department of Occupational Therapy, College of Health and Medical Science, Cheongju University: 298 Daeseong-ro, Cheongwon-gu, Cheongju-si, Chungcheongbuk-do 28503, Republic of Korea

Abstract. [Purpose] The present study aimed to investigate the association between body awareness with postural control and independence in performing activities of daily living in patients with hemispheric stroke. Eighty-one patients who were diagnosed with stroke participated in this study. [Participants and Methods] The participants were divided into three groups according to their risk for falls. Furthermore, these participants were classified into four groups according to their degree of independence in performing activities of daily living. This study used three measuring tools, namely the body awareness questionnaire, Berg balance scale, and modified Barthel index. [Results] Body awareness was significantly correlated with balance function in the group with low risk for falls compared with that in the group with high risk for falls. Body awareness was significantly correlated with the degree of independence in performing activities of daily living in the group that needed minimal assistance compared with the groups that needed moderate and severe assistance. Results showed that body awareness was associated with postural control and the degree of independence in performing activities of daily living in individuals with hemiparetic stroke. [Conclusion] Body awareness is among the primary factors that affect the motor function of patients with stroke in rehabilitation settings.

Key words: Balance, Body awareness, Daily activity

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INTRODUCTION

The cortical processing of health-related information is important for motor performance in humans. Body awareness is one of the major criteria used in processing human information, which is utilized for perception, decision making, and action¹⁾. Accurate body information is important for a precise control of movements. In stroke survivors, reduced body awareness affects the patient's performance of activities of daily living. According to Guidetti et al., some patients feel like strangers to themselves after stroke because they feel that their body is different. When body awareness is focused on movements, postural control, balance, free breathing, and coordination are affected²⁾. Dynamic balance and postural stability trainings facilitate body awareness, and they can be beneficial for individuals with hemiparesis. Previous studies have found that differences in normal body awareness and reduced body awareness between the groups may not directly cause body awareness problems as shown by the patients' performance of activities of daily living, particularly how the movement felt in their bodies and how movements are integrated in their everyday life³⁻⁵⁾.

Previous studies on the association between body awareness with the level of balance function and independence in performing activities of daily living are limited. The differences in body awareness and its effects on balance function and independence in performing activities of daily living are often clinically assumed. Body awareness in patients with hemispheric stroke is associated with the actual performance of relevant and meaningful tasks every day. Therefore, this study aimed to

Corresponding author. Si-Nae Ahn (E-mail: otlovesn@gmail.com)

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compare any difference in body awareness and its effect on balance function and independence in performing activities of daily living in patients with hemispheric stroke.

PARTICIPANTS AND METHODS

The present study included 81 participants with hemispheric stroke. The inclusion criteria were as follows: (1) adults who were diagnosed with stroke, (2) those who obtained greater than 19 points in the mini-mental state examination, (3) those without problems in verbal communication, (4) those who were able to set their goals for desired occupational performance, and (5) those who agreed to participate in the research. This study was approved by the institutional review board committee of Baekseok University.

This cross-sectional study was based on a face-to-face interview. First, participants who met the inclusion criteria were identified. Second, body awareness of the participants was assessed using a questionnaire that was answered during the face-to-face interview. Third, functional status was investigated using the assessment tools for balance function and independence in performing activities of daily living. Fourth, the participants were classified into three groups based on balance function (high, medium, and low risk for falls). Moreover, they were divided into four groups based on the level of independence in performing activities of daily living (severe, moderate, mild, and minimal assistance). Fifth, the effects of body awareness on balance function and independence in performing activities of daily living were compared.

The following information was obtained from the patient's files: date of birth, gender, dominant side, hemiparetic side, etiologic type, and date of onset. This study also used the Berg balance scale (BBS), modified Barthel index, and body awareness questionnaire. BBS was used to examine an individual's ability to assess static balance with the risk for falls in the adult population. This 14-item scale is designed to assess a person's ability to perform activities during assessment, and the item-level scores range from 0 to 4 with a maximum score of 56. These participants were divided to three groups: high risk for fall (score: 0–20), medium risk for fall (score: 21–40), and low risk for fall (score: 41–56)⁶. MBI was used to measure the independence in activities of daily living. The level of independence in activities of daily living of the participants was rated on four grades according to a standardized MBI classification system. The participants were divided into four groups: severe assistance (score: 0–49), moderate assistance (score: 50–74), mild assistance (score: 75–90), and minimal assistance (score: 91–99)⁷. Body awareness focuses on body information, including body perception, postural perception, proprioception, kinesthesia, and deep sensory. In this study, questionnaire on body awareness was constructed based on this definition and body awareness assessed using this questionnaire during a face-to-face interview.

A frequency analysis was conducted, and descriptive statistics was used to analyze the general characteristic of patients with hemispheric stroke. Differences in body awareness were evaluated using ANOVA. Post-hoc comparisons were carried out using the Scheffe's method results showed differences between the groups. For the statistic program, PASW version 18.0 (SPSS Inc., Chicago, IL, USA) was used, and an α value of 0.05 was considered statistically significant.

RESULTS

In total, 81 participants were included in the study (Table 1). When body awareness is focused during closing and opening of the eyes, differences were observed in the group with high risk for falls (Table 2). The group with low risk for falls had a significantly higher body awareness than the group with high risk for falls. The group with low risk for falls had a significantly higher body awareness than the group with medium risk for falls. When body awareness is focused during opening of the eyes, differences were observed among the participants who needed severe, moderate, mild, and minimal assistance. The group who needed minimal assistance had a significantly higher body awareness than the groups who needed severe and moderate assistance (Table 3).

DISCUSSION

Stroke survivors have visuoperceptual deficits, with a reported incidence ranging from 32% to 40%. These deficits include body scheme or image disorders, problems in spatial relationships, and unilateral neglect¹. Thus, these patients lack awareness in some parts of their body or external environment. These characteristics of stroke survivors may cause activity limitation and may involve the use of more extremities. In fact, hemiparesis is one of the major clinical problems after stroke, and it may lead to reduced postural stability, asymmetrical stance, restricted walking balance, and dependence in performing activities of daily living¹. Therefore, this study investigated and compared body awareness, balance function, and independence in performing activities of daily living in patients with hemispheric stroke.

Previous studies have shown the relationship between body awareness and other clinical problems, such as irritable bowel syndrome, fibromyalgia and chronic pain, use of prostheses, and eating disorders^{3, 5, 8, 9}. Catalan-Matamoros et al. have reported that basic awareness therapy is effective in improving some symptoms in outpatients with eating disorders. Sjødahl and colleagues have shown that body awareness training may improve the skills, particularly participation level, of individuals with transfemoral amputee, and may help individuals live a normal life^{3, 10}. Stauffer et al. reported that body awareness have shown to related to process ability of activity of daily living¹¹. These studies have reported the effects of

Table 1. Clinical characteristics of the patients with hemispheric stroke (N=81)

Characteristic		M ± SD (min-max)	N (%)
Gender	Male		46 (56.8)
	Female		35 (43.2)
Hemi side	Right		39 (48.1)
	Left		42 (51.9)
Age (yrs)		58.93 ± 13.62 (20–80)	
Post-stroke duration (month)		15.77 ± 12.84 (1–62)	
MFT (affected side)		29.28 ± 2.49 (17–32)	
MMSE-K		25.62 ± 4.30 (13–30)	

Table 2. Comparisons of BBS and body awareness (N=81)

Dependent variable		Mean ± SD			F	p
		High fall risk (n=22)	Medium fall risk (n=25)	Low fall risk (n=34)		
Eyes open	Back	2.27 ± 0.76	2.16 ± 0.62	2.68 ± 0.53	5.495	0.006
	Back pressure	2.32 ± 0.78	2.08 ± 0.75	2.59 ± 0.60	3.784	0.027
	Hip	2.14 ± 0.83	2.24 ± 0.59	2.59 ± 0.60	3.561	0.033
	Hip pressure	2.14 ± 0.83	1.92 ± 0.49	2.59 ± 0.60	8.225	0.001
Eyes closed	Knee flexion	1.77 ± 0.86	2.00 ± 0.86	2.47 ± 0.70	5.557	0.006
	Ankle flexion	1.86 ± 0.94	2.08 ± 0.86	2.74 ± 0.56	9.815	0
	Foot	1.64 ± 0.72	1.96 ± 0.61	2.44 ± 0.66	10.332	0
	Foot pressure	1.68 ± 0.89	1.92 ± 0.75	2.59 ± 0.60	11.521	0
	Foot position	1.86 ± 0.94	2.08 ± 0.75	2.62 ± 0.60	7.545	0.001

Table 3. Comparisons of MBI and body awareness for eye closed (N=81)

Dependent variable	Mean ± SD				F	p
	Severe assist (n=18)	Moderate assist (n=31)	Mild assist (n=18)	Minimal assist		
Knee flexion	2.00 ± 0.90	1.90 ± 0.87	2.17 ± 0.78	2.79 ± 0.42	4.111	0.009
Ankle flexion	2.11 ± 0.96	2.06 ± 0.89	2.44 ± 0.78	2.86 ± 0.36	3.508	0.019
Foot	1.89 ± 0.83	1.90 ± 0.65	2.22 ± 0.80	2.50 ± 0.51	2.926	0.039
Foot pressure	1.78 ± 0.94	2.06 ± 0.81	2.22 ± 0.80	2.64 ± 0.49	3.227	0.027
Foot position	2.11 ± 0.96	2.00 ± 0.77	2.44 ± 0.78	2.71 ± 0.46	3.261	0.026

body awareness therapy on musculoskeletal pain or gait performance but not the relationship between body awareness and musculoskeletal pain or participation level.

This study showed the association between body awareness with balance function and independence in performing activities of daily living. A high level of body awareness was observed in the group with high balance abilities and independence in performing activities of daily living. By focusing on the body, the attention is both on the doing and what is experienced during movements, which in turn increase the physical and mental aspects of body awareness. The present study was conducted to present the clinical application of body awareness that can improve the motor function of patients with hemispheric stroke. The results of this study showed that body awareness is important for balance function and the performance of daily activities in patients with hemiparetic stroke.

The present study had some limitations. The findings were based on a small number of occupational therapists who work with individuals with hemispheric stroke in rehabilitation settings. Another possible limitation is the use of a self-reported questionnaire to assess body awareness.

Conflict of interest

None.

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