The Kinetic and Kinematic Evaluation Indices in the Sit-to-Stand Movement of Stroke Patients

Yuji OSADA, PT, Masako FUCHI, OT
Seiai Rehabilitation Hospital

Yuji OSADA, PT, Sumiko YAMAMOTO, Dr.Eng. PhD
Graduate School of International University of Health and Welfare

**Purpose:** The purpose of this study was to extract the kinetic and kinematic factors of the sit-to-stand (STS) movement of stroke patients. To determine these factors, we analyzed the relationship between patient kinetic and kinematic data and indices of physical ability.

**Methods:** Thirty four subjects who had experienced stroke performed the STS movement from a stool, and their movement was measured by a motion analysis system (VICON). The relationship between kinetic and kinematic data and indices of physical ability (gait speed, the functional independence measure, and the Fugl-Meyer Assessment) was analyzed using the Spearman rank correlation coefficient.

**Result:** The execution time of STS and the ratio of the load on the affected side at seat-off correlated with many physical ability indices. The anteroposterior movement range of the center of pressure during STS correlated with the following kinetic and kinematic factors. The duration of momentum phase, which began with initiation of movement and ended just before the buttocks were lifted from the chair (Phase 1) correlated with the lower limb functions of the affected side as well as with the balance function. The duration of extension phase, which began with maximal ankle dorsiflexion and ended with hip extension (Phase 3) correlated with the balance function.

**Conclusions:** The following kinetic and kinematic factors were determined to be useful as indices for the mechanical evaluation of STS movement in stroke patients: execution time of STS, ratio of the load in the affected side at seat-off, and the anteroposterior movement range of the center of pressure during STS. Results revealed that the lower limb functions of the affected side are important to Phase 1 while the balance function is important to both Phase 1 and Phase 3.