RELATIONSHIP BETWEEN BODY SWAY DURING EYES-OPENED ONE-LEG STANDING AND FOOT FUNCTION IN HEALTHY FEMALE SUBJECTS

Murata Shin
(Himeji Dokkyo University, Japan)

PURPOSE: One-leg standing ability and its related factors have been studied in elderly subjects. In past studies on muscular strength in the upper and lower limbs, only part of the muscles were examined. To examine factors involved in one-leg standing, it is necessary to measure and evaluate total body function. In this study, we measured the muscular strength of the lower limbs, foot grip, and plantar sensitivity, which were considered to affect one-leg standing, and evaluated the relationship between these parameters and body sway during eyes-opened one-leg standing. RELEVANCE: Effective physiotherapy for the enhancement of one-leg standing ability is evaluated by comprehensive examination. SUBJECTS: The subjects were 33 healthy adult females (average age 22.2 ± 2.6 years). Eyes-opened one-leg standing over more than 30 sec was possible in all subjects. METHODS: Body sway on one-leg standing was measured for 30 sec using a stabilometer. The isometric contraction was measured as the muscular strength of the lower limbs using Hand-held dynamometer, and the foot grip was measured using a foot grip meter. With regard to plantar sensitivity, the 2-point discrimination sensitivity in the heel and thenar regions was measured using a vernier caliper, and the mean was analyzed. These measurements were performed in the dominant leg. ANALYSIS: The relationships between body sway (total trajectory length and circumferential area) and other body measurement values were examined using Pearson’s correlation coefficient. Multiple regression analysis (stepwise method) was performed using body sway on one-leg standing as the objective variable, and factors affecting body sway were extracted. RESULTS: Body sway on one-leg standing was significantly correlated with the 2-point discrimination sensitivity (0.67), foot grip (-0.53), femoral quadriceps muscle strength (-0.43), and middle gluteal muscle strength (-0.42). Factors involved in body sway in the one-leg standing position extracted by stepwise regression analysis were the foot grip (0.49) and 2-point discrimination sensibility (0.43). CONCLUSIONS: These results suggested that foot functions, such as foot grip and 2-point discrimination sensibility, affected body sway in the one-leg standing position rather than the strength of major muscles in the lower limbs, such as femoral quadriceps muscles. To enhance one-leg standing ability in subjects who can stand on one foot for more than 30 sec, it was suggested that improvement of plantar sensibility and foot grip is more important than strengthening the major muscles of the lower limbs.