The sit-to-stand (STS) movement is a common skill of daily living and an important measure of physical function that requires adequate postural control to transfer the center of mass over the feet and maintain alignment of the upper and lower body segments. However, children with cerebral palsy (CP) have difficulty in performing STS movement effectively, as they often show deficits in movement and postural control. Therefore, improvement of STS performance plays a crucial role in the improvement of social participation in these children. Previous studies demonstrated beneficial effects of some intervention in STS of children with CP. However, the main focus of these interventions was on lower limb impairment with less consideration of the key role of trunk control during STS movement and its deficit in children with CP. From these points of view, we are interested in understanding whether quick trunk movements could improve trunk control in children with CP and therefore allow them to perform STS more efficiently. Thus, this research study aimed to assess the immediate effects of a quick-seated trunk movement exercise (QSTE) on STS movement in children with CP.

In research I, the study participants included five children with spastic CP, aged 6–17
years. All participants received five sessions of natural STE (NSTE) at a self-selected speed as a control intervention. Following a 50-min rest period, five sessions of the QSTE were conducted as an experimental intervention for each child. Assessments were performed before and after each intervention in a single day. To assess STS movements, a motion analysis system with four cameras that were synchronized with a pressure-sensitive trigger device was used. The sagittal and angular movements of the trunk, hip, knee, and ankle were calculated. Then, the total STS task duration and the maximum trunk forward tilt and ankle dorsiflexion angle were calculated.

The results of research I showed a significant difference in the total duration of the STS movement before and after NSTE (2.40 ± 0.67 s vs. 2.24 ± 0.44 s) and QSTE (2.41 ± 0.54 s vs. 2.06 ± 0.45 s). However, there was no significant difference in the kinematic parameters after both interventions.

Despite the same STS performance before natural and quick STE, possibility of learning effects due to the single day measurement may limit the generalization of the results in research I.

Thus, to decline this limitation, multiple day measurement was chosen in research II. A total of seven children with spastic diplegia CP, aged 4–13 years, participated in this study. All subjects participated in both experimental and control intervention. First, participants were assessed before the experimental intervention (pre-test). Then, after 3–5 days of washout period, they were reassessed (post-test) immediately after receiving five sessions of QSTE for experimental intervention. Second, after 2–4 weeks of interval, all participants were assessed before the control intervention (pre-test). Following 3–5 days of washout period, they were reassessed immediately after control intervention (post-test). The participants sat for 10 minutes on a stool for the control intervention. A conventional video recording camera was used to record STS movements. The sagittal and angular movements of the trunk, hip, knee, and ankle were calculated for each lower limbs using Image-J. Then, the total STS task duration was calculated.

The results of research II showed that the start position and STS duration of pre-test data were not significantly different for experimental and control intervention. A significant difference was observed in the total duration of the STS movement before and after QSTE (2.67 ± 0.34 s vs. 1.69 ± 0.11 s). However, no significant change was found between the total duration of the STS movement before and after control intervention (2.49 ± 0.25 s vs. 2.41 ± 0.18 s).

The total duration of the STS movement significantly decreased after QSTE in both researches. Although QSTE did not change the abnormal kinematic pattern of the STS movement, QSTE may improve trunk control, which in turn would help children with CP to
perform STS movement faster. These improvements would facilitate their social participation and lead to better performance during daily activities.

Keys Words: Fast trunk exercise, Sit-to-stand, Cerebral palsy