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The Effect of assistive force of rehabilitation robot on upper extremity function in stroke patients

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Objective
Recently, robot-assisted therapy has been reported to have beneficial effects on upper extremity function among stroke survivors. However, it lacks of studies about the differential effects according to the characteristics. We tried to explore whether assistive force of rehabilitation robot is beneficial or not, as assistive force has been regarded as important characteristics.

Method
This study was a single blinded randomized controlled trial among chronic stroke survivors who showed upper extremity muscle strength above or Medical research council grade 3. Participants were randomly allocated to the robot supported by assistive force(SA) (Armeo® Power; Hocoma Inc, Zurich, Switzerland) or robot without assistive force(WOA) (Armeo® Spring; Hocoma Inc, Zurich, Switzerland). Each participant completed 20 sessions of 30-minute training with conventional therapy over 4 weeks. The primary outcomes were changes in Fugl-Meyer assessment of the upper extremity function (FMA-total and FMA-proximal) and Wolf Motor Function Test (WMFT-score, WMFT-time and WMFT-weight). Assessments were performed at baseline (T0), 2 weeks (T2), 4 weeks (T4) and 8 weeks (T8) after the baseline. Comparisons between two groups were performed using RM-ANOVA and $p<.05$ was used to indicate a significant difference.

Results
Among 20 randomized patients, 19 participants (10 in the the SA group, 9 in the WOA group) completed 4 weeks of intervention. There were no significant differences in baseline characteristics between the SA and the WOA group. Both groups showed improvements in most of outcomes over time ($P<.05$) except WMFT-weight. Both groups showed no significant differences in WMFT-weight over time. ($P=.06$ and $P=.21$) There were no statistically significant time x group interactions for all outcomes including FMA-total, FMA-Proximal, WMFT-score, WMFT-time and WMFT-weight.($p=.43$, $p=.68$, $p=.50$, $p=.46$ and $P=.69$ respectively)

Conclusion
In our study, both groups showed statistically significant improvement on upper extremity function after intervention. However, there were no statistically signifiant differences between presence or absence of assistive force. In the future, detailed kinematics study could reveal minor difference between two types of robot.