Changes in Hand Function in Chronic Strokes after Using a Novel Passive Hand Function Therapy Device for 3-Weeks

AUTHORS: Dr. Jed Meltzer, Dr. John de Grosbois, Mikayla Marshall, Eric Dumais, Sabira Alibhai-Najarali, Grace Wang, Madeline Heleno, Si-Yuan Pan, Aarzoo Arya, Jennifer Shao, Margot Shima, Dr. Alica Rogojin, Dr. Aimee Nelson, Dr. Vineet Johnson, Dr. Jocelyn Harris

Current word count: 284 (Max 300)

Objective: The primary goal of this study was to assess the ability of passive hand function training (HFT) to mediate motor recovery in chronic stroke.

Design: Single arm

Setting: Hospital lab setting

Participants: 11 chronic stroke patients (10.3 ± 9.67 years post-stroke, 59.8 ± 20.32 years of age).

Interventions: Fifteen, 1-hour HFT sessions over three weeks using gamified, real-time feedback presented on an Android tablet.

Main Outcome Measure: The Action Research Arm Test (ARAT), and Box and Block Test (BBT). Pre-intervention ARAT scores were used to classify participants as Low (n = 7), Moderate (n = 2), or High (n = 2) functioning (ARAT scores to separate the groups are as follows: Low: 0 – 19, Medium: 20 – 38, High: 39 – 57).

Results: The low-functioning group demonstrated statistically significant functional improvement on the ARAT (PRE: 6.71± 5.15, POST: 11.57± 9.22, p=0.021). The moderate and high function groups demonstrated a positive trend in changes on ARAT (Moderate PRE: 34.5± 3.54, POST: 49± 4.24, p=0.09, High PRE: 48.5.5± 4.95, POST: 55± 2.83, p=0.09) scores. However, due to the small sample size (n=2 in the Moderate and High function groups), statistical significance was marginal. The results of the BBT (Low PRE: 0.29 ± 0.76, POST: 0.43± 1.13, p=0.16, Moderate PRE: 14.5 ± 0.71, POST: 24 ± 0.71, p=0.09, High PRE: 20.5 ± 14.14, POST: 30.5± 7.78, p=0.09) followed a similar trend.

Conclusion: These findings demonstrate high potential for using patient-driven, passive devices for HFT in chronic stroke recovery. In addition, these preliminary results should drive more investigation in the changes of the low-function group, as they appear to challenge the notion of proportional recovery. Future studies should include significantly more participants and increased treatment timelines.

Keywords: Hand, Stroke, Neurorehabilitation