EFFECTS OF ACTION OBSERVATION TRAINING IN GAIT SPEED OF STROKE PATIENTS: A CASE SERIES

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ABSTRACT

Stroke is considered as a primary cause of disability and results to problems in activities of daily living. Action Observation Training (AOT) is an emerging cost-effective physical therapy intervention (PT) which involves facilitation of mirror neurons through viewing of video clips of a healthy individual performing an activity similar to that of the desired task. This intends to describe the effects of AOT used in conjunction with conventional PT interventions in gait speed of stroke patients. This case series involves four stroke patients with over 6 months of stroke and can ambulate independently, who underwent PT sessions for three times a week for four weeks. Interventions included an hour of conventional PT intervention for the lower extremity and AOT done by watching a video clip of a healthy individual while walking on even surface, with anterior, lateral and posterior views. The gait speed was assessed in pretest and posttest using 10-Minute-Walk Test (10-MWT). A difference of 0.16 m/s in 10-MWT from baseline reveals a clinically significant change in gait speed. Results showed one patient had a clinically significant improvement in fast gait speed with 0.23 m/s difference from baseline. Meanwhile, one patient had a difference of 0.25m/s in preferred walking speed considered as clinically significant. Two patients did not present a clinically significant difference in the pretest and posttest scores of 10-MWT but with a statistically significant difference in their preferred walking speed. While the study and results showed better understanding of AOT and its clinically significant improvements in gait speed, the effects cannot be generalized nor be sufficient enough to conclude its effectiveness, but opens direction for future research and possible utilization in healthcare.

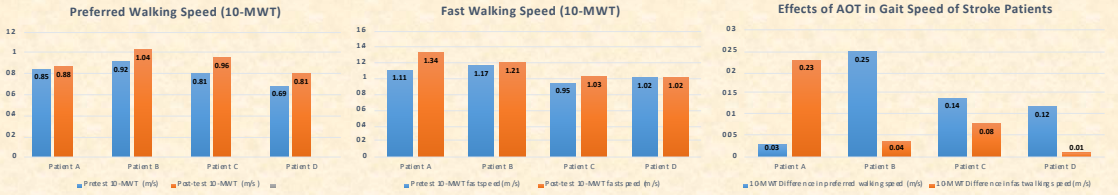
METHODS

Case series was utilized in this study in order to give out a deeper understanding of innovative therapies and intervention like Action Observation Training (AOT). The physiatrist evaluated the subjects and screened them using a set of inclusion criteria: (1) stroke > 6 months in duration, (2) patients ages 35-70 years old, (3) walk independently up to 10 meters, (4) can follow instructions and (5) those without spatial neglect. Potential subjects were excluded if they have other medical conditions contraindicated to exercise, concurrent vestibular problems which can affect their stability and predispose them to falls, and presence of any visual field defects. The physiatrist also determined the duration of stroke, side of hemiparesis, stroke etiology, history of previous PT treatment, muscle strength using manual muscle testing, spasticity using Modified Ashworth Scale and degree of disability using the Modified Rankin Scale for profiling. An assessor measured the baseline speed of the subjects at pre-test using the 10-Meter Walk Test (10-MWT). 10-MWT is one of the most commonly used assessment to determine the speed of walking among various populations. This tool can measure both the preferred walking speed and the fast walking speed, and exhibits outstanding psychometric properties[1]. The minimal detectable change (MDC) of this tool is 0.09 m/s while its minimal clinically important change (MCID) is 0.16 m/s.

The subjects received conventional physical therapy regimen and AOT for three times a week, for four weeks. Conventional physical therapy regimen for the involved lower extremity exercises such as strengthening exercises, sit to stand, weight shifting, stepping forward, backward and sideways, step up and down, and ambulation on a 10-meter walkway. The AOT was done through watching a video clip for three minutes showing a healthy individual walking on a 10-meter level surface flashed on a 24-inch LED HD television (Resolution: 1366 x 788) placed approximately 0.50 meters away from the chair with armrest (height: 16.5 inches), where the subject was asked to sit comfortably (trunk erect and supported by the chair's back support, hip and knees in 90 degrees of flexion, foot flat on the floor). These activities were shown with anterior, posterior and lateral views, in normal speed and half the normal speed. After completing 12 session, the subjects were assessed for post-test using 10-MWT and post-study debriefing covering home education programs was conducted at the end of their participation in the study conducted by the researcher.

RESULTS

The data obtained were analyzed using descriptive statistics, where the MDC and MCID of the 10-MWT was used to determine any significant change in the pre and post-test assessments. Patient A is a 50-year-old female who suffered stroke for one year and 2 months. This result showed that fast walking speed was both statistically and clinically significant. Patient B, on the other hand, suffered stroke eight years ago and never received any therapeutic interventions. Only the preferred walking speed showed a statistical and clinically significant change in the patient's gait speed. Meanwhile, patient C is a 61-year-old female patient who suffered hemorrhagic stroke nine months ago. Both differences did not yield a clinically significant change in the gait speed, but preferred walking speed revealed a statistically significant difference. Lastly, Patient D is the only subject who ambulates with assistive device (single-tip cane). He is a 50-year-old patient who suffered stroke 3 years ago. Patient D also had a statistically significant difference in the preferred walking but but did not have a clinically significant difference in both walking speeds. Presented below are the results of the pretest and posttest:



The preferred speed of patient A, B and C's measured in the pretest and posttest fall beyond the preferred walking speed of stroke patients which is 0.2 m/s to 0.8 m/s[2][3]. Meanwhile, patient D's preferred walking speed during the pretest was 0.69 m/s which falls between the identified range, but progressed to 0.81 m/s during the posttest. In both the pretest and posttest assessment of gait speed, the fast walking speed of patient A, B, C and D all falls in the range identified to be 0.3 m/s to 1.8 m/s [2][4]. AOT stimulates the pathways responsible for imagination, observation and execution of movements, and stimulates greater cognitive processes that is geared towards learning sequences that eventually leads to retention of motor functions and planning of movements vital to actual performance of desired task. Neuroplasticity can be induced through the formation of motor memory shaped through AOT that acts as a visual reinforcement acting as an external cue when the patient performs the walking task. When combined with conventional rehabilitation, it allows formation of motor and kinesthetic memory leading to a better physical functioning among chronic stoke patients[5][6][7].

CONCLUSIONS

Although a case series cannot relate or find association between outcomes and factors identified in the study, the results of this study, when considered alongside with previous studies in stroke rehabilitation, adds to the body of evidences showing statistical and clinically significant improvements not just in the preferred walking speed, but also in fast walking speed after the addition of AOT in conventional physical therapy. Even though the results obtained from this study showed that only two patients showed a clinically significant improvement after utilization of action observation training and conventional physical therapy intervention for three times a week for four weeks, it cannot be concluded that the utilization of AOT in combination with conventional physical therapy intervention is effective in improving the gait speed of chronic stroke patients. The research design limits the researcher to generalize the result as it lacks a sufficient amount of subjects and the lack of control group. Further studies with larger sample size and an experimental design can be utilized for future studies.

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