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EFFECTIVTENESSS OF SPEED DEPENDENT TREADMILL TRAINING VERSUS CONVENTIONAL TRAINING TO IMPROVE GAIT VELOCITY FOR HEMI PARETIC PATIENTS

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ABSTRACT

Background: Stroke is the disease that affects the arteries leading to and within the brain. It is the number 5th reason for death and a leading cause of impairment all over the world. Stroke happens over the blood vessels that convey the oxygen and supplements to the cerebrum is either hindered by clump or blasts. The incidence of stroke affects approximately 6, 00,000 individuals each year with the estimated number of 4, 00,000 stoke survivors. In this study an attempt is made to enumerate the gait velocity in hemiparetic stroke patients. **Objective**: The object of the study is to know the difference between effectiveness of speed dependent treadmill training versus conventional training to improve gait velocity for hemiparetic patients. **Methods**: The study was done in physiotherapy department, MGMCRI where the patient was referred from neurology department. A sum of 30 samples was selected from the population using convenient sampling method. All the 30 samples were divided into 2 groups consisting of 15 members each. The gait velocity was recorded using the stopwatch on both group prior to the training program is the pretest measurement was taken. Experimental group received speed dependent treadmill training. The conventional walking training 4 sessions per week for 4-week duration. The post test results were recorded and documented. The population was selected based on the inclusion criteria. Patients with cognitive deficit, orthopedic disorders, unstable cardiovascular patients and unco-operated patients were eliminated from this study. **Result**: the result of the study makes us conclude that sped dependent treadmill training is much effective in improving the gait velocity then the conventional walking training.

Keywords: Stroke, Treadmill training, Gait velocity, speed dependent treadmill training, conventional walking training, hemiparetic stroke.

Introduction:

Stroke is the third leading cause of death and the most common cause of disability in patient population. Stroke is the acute onset of neurological dysfunction due to an abnormality in cerebral circulation with resultant sign and symptoms that corresponds to the involvement of focal areas of the brain. Clinically a variety defects are possible, including changes in levels consciousness, impairments of motor, sensory, cognitive and perceptual and language functions. Motor deficits are characterized by weakness or paralysis typically on the side of the body opposite side of cession[1,2]. To know the difference between effectiveness of treadmill training and conventional training to improve the gait velocity of hemi paretic patient. A new gait training strategy for patients with stroke seeks to increase the gait speed through treadmill training[2,3,4]. This study compares the effect of structured speed dependent treadmill training and conventional gait training on clinical outcome measures for patient with hemi paresis[3,6].

Design and Methodology:

The study was experimental in nature 30 samples were selected by using stratified random procedure and were divided into two equal groups. i.e., Experimental group (n=15) and Conventional group (n=15). Pre-test measurements were taken for gait velocity through 10-meter walk test by using stop watch. After pre-test experimental group received treadmill training for 30 minutes, 4 sessions per week for 4 weeks. Conventional group received conventional training for 4 minutes four sessions per week for 4 weeks durations.

Post-test measurements was taken on 30th day in similar fashion as that of pre-test measurements. Samples aged between 50 to 60 years, both genders, with duration of hemi paresis of 4 weeks, slight spasticity of grade 0 to 1(as per Asworth's score 0-1), patient able to walk without any assistance(FAC score -3), stable cardiovascular status, absence of ischemia or angina during exercise or at rest were taken as inclusion criteria.

Samples with cognitive deficits, orthopedic and other gait influencing diseases such as arthrosis or operated patients, unstable cardiovascular patients and un co-operated patients were excluded. Populations who full filled inclusion criteria were taken for the study. Samples of 30 subjects were selected from the population using stratified random sampling. Stop watch used to measure the gait velocity. The stop watch used to measure the gait velocity is valid one and has high inter rates reliability. The study was conducted in Department of Physiotherapy, Mahatma Gandhi Medical College & Research Institute, Pondicherry. The independent variable is used in the study is Speed dependent treadmill training and Conventional training. And Dependent variables is Gait velocity. The samples of 30 subjects were divided into 2 equal groups (experimental group and conventional group). After obtaining a verbal consent, the treatment methods were explained to each subject. All the subjects were assessed with a pre-test proforma, which had provisions to record the subjects' basic demographic data and the details of pre-test and post-test.

Pre- Test

All the subjects of both the groups were subjected to pre- test to access the gait velocity through 10 meters walk test using stop watch and it was calculated by the formula

Gait Velocity = Distance/Time

Before starting the training session for both groups, an entry screening test was to evaluate cardiovascular tolerance. Exercise tests were performed on treadmill, with continuous monitoring of ECG and vital signs. The test was initiated with a belt speed of 0.2m/s. The belt speed was increased by a maximum of 0.1m/s increments, according to the patient's tolerance.

Experimental Group

After the pre-test, the subjects of experimental group were trained with treadmill 30 minutes per day, 4 sessions per week for 4 weeks. The goal of the speed dependent treadmill training is to achieve an increase in walking speed with each training session. All patients in experimental group wore unweighted safety belt. The patients were assisted during the treadmill training by a therapist, but the therapist gave no assistance in the actual performance of the movement. Because of the high belt speed, the therapist was unable to provide any direct facilitation of the gait cycle. The maximum over ground walking speed was determined before the first session (VO2 max). This speed was then half and used for 5-minute warm-up on the treadmill. After the warm up the first speed dependent training phase (Vt1) began. During a period of 1-2 minutes, the belt speed was increased in communicating with the patient, to the highest speed at which the patient could walk safely without stumbling. If the patient maintained the speed and felt safe during the 10 seconds at Vt1, then the speed would then be increased by 10% during the next attempt. This speed (Vt2) was again held for 10 seconds, followed by another recovery period. If the patient, during any phase, was unable to maintain the speed felt unsafe or stumbled on the belt, then the speed was reduced by 10% in the next phase. This maximum achieved belt speed was held for 10 seconds, followed by a recovery period during which the patient's pulse was allowed to return to its resting level. Blood pressure was monitored manually during every training phase and during measurement of over ground walking speed in both groups. Additionally, every treadmill training was supervised by a physiotherapist. If blood pressure rose to _200mmHg systolic or_110mmHg diastolic or pulse rose to _160/min, training was discontinued. Each time the patient successfully completed 10 seconds of walking at the set speed was increased during the next phase by 10% over the course of each training session. The total walking distance varied from session to session. At the next training session, the treadmill would be set to the last achieved maximum speed from the previous session. The treadmill was run at 0% incline. All the procedures were done 30 minutes for a day, 4 sessions per week for 30 days[5,7,8,12].

Conventional Group

The subjects of conventional group were provided with conventional or floor training. The procedure was done 45 minutes per day, 4 sessions per week for weeks. The training duration is little higher than experimental group 1 because of the preparation time of the patient and time moving the patient on the floor during the training[5,7,8,12].

Post Test

Post-test assessment of all the members of both the groups were done in a way similar to the pre-test and the speed of gait velocity were documented.

Observation and Analysis:

The collected were subjected to paired T test individually for experimental group and conventional group

Table 1: Paired T test for experimental group(speed dependent treadmill training)

VARIABLE	T – Cal VALUE	T – Tab VALUE
Gait velocity	20.26	2.145

Table 1 and Graph 1, displays the statistics analysis of experimental group, the T-Cal Value was 20.26 and T-Tab Value was 2.145.

Table 2: Paired T test for conventional group

VARIABLE	T – Cal VALUE	T – Tab VALUE
Gait velocity	16.17	2.145

Table 2 and Graph 2, displays the statistics analysis of Conventional group, the T-Cal Value was 16.17 and T-Tab Value was 2.145.

The T table value for n= 1 degree of freedom at 5% level of significance was taken 't' calculated > 't' table value. After the paired 't' test the data were subjected to independent 't' test to analyse a significant difference in improvement between experimental group and Conventional group

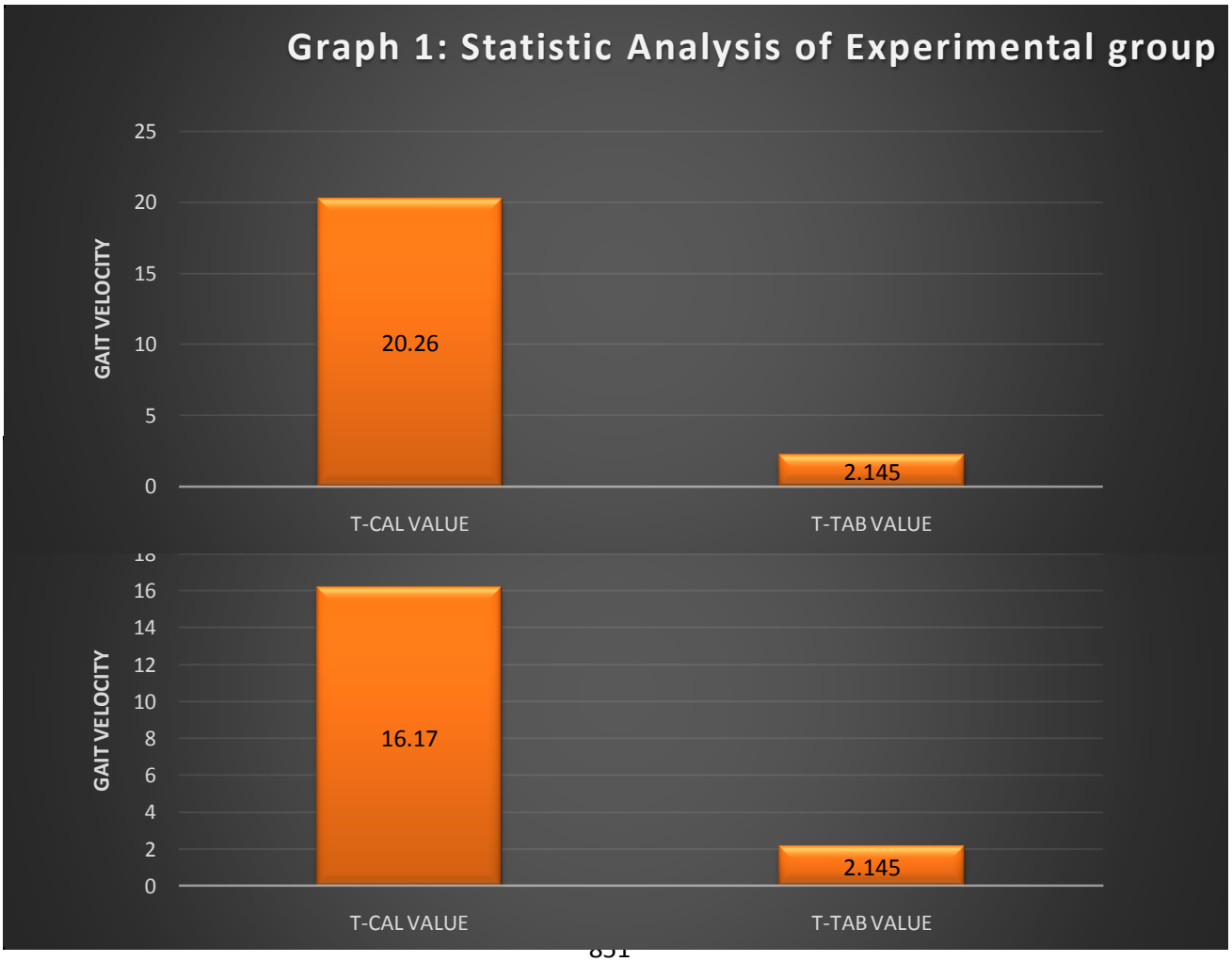
Table 3 - Independent 't' test

VARIABLE	T – Cal VALUE	T – Tab VALUE
Gait velocity	8.88	2.050

Table 3 and Graph 3, displays the statistics analysis of Independent 't' Test, the T-Cal Value was 8.88 and T-Tab Value was 2.050.'t' calculated value > 't' table value.

RESULTS:

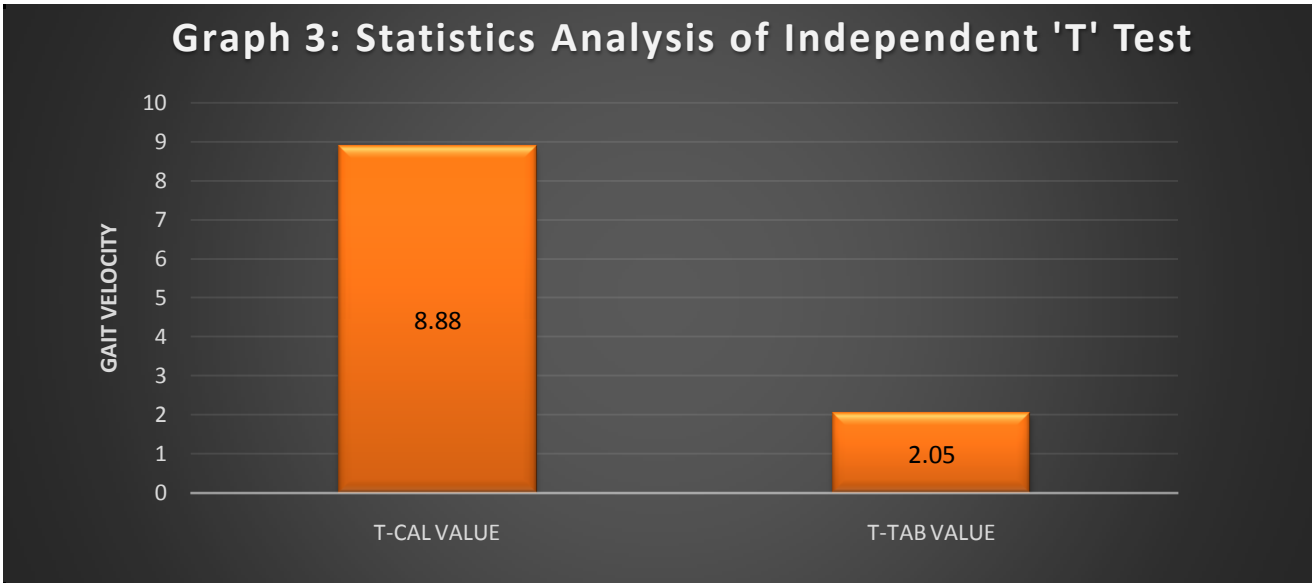
There is statistically significant improvement in the gait velocity for patients trained with speed dependent treadmill training. There is also statistically significant improvement in the gait velocity for patients trained with ground walking. There is statistically significant difference in improvement of gait velocity by speed dependent by treadmill training then conventional training[9,11,13].



DISCUSSION:

The result of the study shows in favour of speed dependent treadmill training for improving gait velocity for the hemiparetic patients. The mechanisms which is behind this are,

- Treadmill training repeated practice of gait cycle, involving alternate loading and unloading of lower limp and hip extension, seems to be main sensory drive to promote the motor activity of gait through lumbosacral specific neural circuits.
- Treadmill training is likely to induce expansion of sub cortical and cortical locomotion area in individual following stroke there by improvements take place in gait velocity after training.



Speed dependent treadmill training significantly improves the walking velocity through.

- Increasing the joint excursion and muscle activation as well as symmetry in the temporal distance factors like cadence & gait velocity
- Seed walking induces marked speed related improvements in body and limb kinematics and muscle activation patterns
- Speed training facilitates the movement coordination and intra limb and inter limb energy transfers

CONCLUSION:

The results of this study make us conclude that speed dependent treadmill training is much effective in improving the gait velocity then the conventional walking training. Hence speed dependent treadmill training can be used as an effective one to improve the gait velocity for hemi paretic stroke patients.

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