Journal of Population Therapeutics & Clinical Pharmacology

RESEARCH ARTICLE
DOI: 10.53555/2hg4h037

"RETRO- WALKING INTERVENTION: ENHANCING GAIT RECOVERY IN POST-MCA STROKE HEMIPLEGIA".

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ABSTRACT:
The purpose of this study is to determine whether or not retro-walking is effective in improving hemiplegic gait symptoms in persons who have suffered a stroke. Both the experimental group and the control group consisted of 38 patients who were medically stable and had experienced their first MCA stroke. This study is considered to be quasi-experimental. During the course of six weeks, the experimental group participated in conventional therapy that was augmented with reverse walking training. On the other hand, the control group was exclusively exposed to the usual physiotherapeutic intervention. The 10 meter walk test and the functional reach test were used to administer a pre-test and a post-test. The pre-test was administered before the functional reach test was performed. A supplemental retro-walking training program was found to be effective in improving hemiplegic gait, according to the scientific investigation.
In conclusion, the study's outcomes indicate that individuals who have suffered a stroke and have been treated with reverse walking have demonstrated significant improvements in both their functional balance and their gait velocity.

Preamble

This study is intended to investigate the possibility of adding reverse walking as an effective tactic in the advancement of hemiplegic gait. The pilot study is done among post-stroke patients, nevertheless, the effect could be tried with other hemiplegics due to Traumatic Brain Injury, partial-brain Surgeries… attaining operative ambulatory independence among the patients at the earliest shall bring confidence and they shall be self-motivated in further intensive therapy for the residual impairments.

STROKE

A stroke occurs when a blood vessel in the brain ruptures and bleeds, or when there's a blockage in the blood supply to the brain. The rupture or blockage prevents blood and oxygen from reaching the brain's tissues.
Stroke is a major cause of long-term physical, cognitive, emotional, social, and vocational disability, among stroke survivors, half are permanently disabled. Paralysis is one of the most common disabilities resulting from stroke. More than 70% of stroke survivors remain vocationally impaired and more than 30% require assistance with activities of daily living.

Hemiplegic Gait

Gait is the medical term to describe human locomotion or the way that we walk. Interestingly, every individual has a unique gait pattern.

Ambulation is the most functional aspect of lower limb activities that keep one's freedom to move around, personally and occupationally involved.

The gait patterns shall be inclined to various anatomical, physiological, psychological, and socio-cultural factors. In different neurological disorders, patients may develop pathological gaits like Ataxic gait, Scissor gait, Parkinsonism gait, etc. Here we worked on Hemiplegic gait where the patients had lost the voluntary control of half side body- upper limb and lower limb, due to contra-lateral brain damage.

Hemiplegic gait also known as Circumduction gait or Spastic gait occurs due to an upper motor neuron lesion. Due to spasticity in the contra-lateral to lesion side, the patient drags or swings the affected leg in a semicircular fashion. Stroke is the primary cause of such gait, but it is similarly demonstrated by cerebral palsy, multiple sclerosis, head injury, and unilateral brain conditions like abscesses or tumors.

There are (4) major criteria essential to walking.

- Equilibrium: The ability to assume an upright posture and maintain balance.
- Locomotion: The ability to initiate and maintain rhythmic stepping
- Musculoskeletal Integrity: Normal bone, joint, and muscle function
- Neurological Control: Must receive and send messages telling the body how and when to move. (visual, vestibular, auditory, sensory-motor input)

Gait deviation in STROKE

Hemiplegic gait is characterized by abnormal arm swings with the arm carried in adduction with flexion at the shoulder, elbow, wrist, and fingers. Also, in many people, there is an extensor synergy of the affected lower limb consisting of extension, adduction, and internal rotation at the hip, extension at the knee, and plantar flexion and inversion at the ankle and foot.

Backward walking

In general, although forward walking is widely performed as a method of walking training, some studies have recently investigated the effects on stroke patients of backward walking.

While backward walking training is currently not practiced by therapists, there are no published data to document the effectiveness of backward walking training for patients with hemiparesis.

Justification / Rational for conducting the study

- The purpose of the present study is to examine the effectiveness of backward walking training on the gait outcome of patient's post-stroke with lower extremity.
- Individuals with Hemiplegia Walk slower and have a slower cadence and shorter stride length compared with no impaired control subjects.
- Backward walking is not practiced and/or recorded by the therapists.
- This shall be an economical and easily applicable intervention by the therapist if found effective.

Null-Hypothesis:

Backward walking training along with task-oriented interventions shall not be significant in improving the gait of patients with post-MCA stroke.

Anticipated implications of the study

- The study is intended to enhance the gait of hemiplegics through Backward walking.
- The positive results shall be the potential to serve a good number of post-stroke survivors back to functionally normal.
- The technique shall be easily administrated and is a costless intervention.

Aim:

- To determine the effectiveness of Backward walking training on the quality of Gait, gait velocity and functional balance in post-stroke Hemiplegic patients.

Objectives:

- To evaluate the effect of Backward walking in terms of gait velocity among Stroke patients.
- To determine Gait improvement in functional balance, walking performance.

Methodology

Study Design: Quasi-experimental approach with pre-test & post-test study design
Source of Data: Peoples Hospital and referred cases from Bhopal
Study duration; About 18 months
Sample Size: approximately 38 subjectswere finalized
Study Variable: Independent variables - Backward walking. Dependent variables, 10 meters walk test and Functional reach test.

Inclusion Criteria

- First MCA Stroke- unilateral
- Patient Medically stable
- Age: 40 – 60 years group
- Any other previous gait deviations
- Any lower limb abnormalities or deformities
- Ability to understand instructions & follow commands.

Exclusion Criteria

- Patient with any co-morbidity or disability other than stroke that would preclude gait training;
- Any uncontrolled health condition for which exercise is contraindicated;
- Orthopedic and other gait-influencing diseases.
- Pre-existing contracture and deformity of hip, knee, and ankle.

Apparatus & Material

Parallel bars (with adjustable height), Stop watch, Camera (mobile phone - for Videography), Measuring tape, Chalk, Yard stick, Paper, Pen…
A neurological assessment chart for pre-screening with inclusion – exclusion criteria listed for primary selection.
For pre and post test 10 meters walk test and Functional reach test were applied

Procedure

The patients were subjected to the screening and selected on purposive sampling and then by systematic sampling the participants were be divided into 2 groups. Experimental Group "A" received all the conventional Physiotherapy for the hemiplegic limb along with backward walking training for 4 weeks. Control Group "B" was also carried on the same exposure/ program of Group "A", apart from backward walking training; for the said duration. Pre-test & post-test shall be done on Wisconsin gait scale scores and gait parameters.

Results

The paired 't' test is employed to assess the statistically significant difference between pre- and post-treatment measurements. The unpaired t-test was employed to assess the statistically significant difference between Group A and Group B.
In the experimental group, the mean functional reach test pretest value was 8.11, and the post-test value was 10.12, with 14 degrees of freedom at a 0.05 level of significance; the tabulated 't' value is 2.83, while the calculated 't' value is 7.41, which exceeds the tabulated value. In the control group, the mean functional reach test pretest value was 7.91, and the post-test value was 9.11, also with 14

degrees of freedom at a 0.05 level of significance; the tabulated 't' value is 2.51, and the calculated 't' value is 3.91, indicating statistical significance.
The mean pretest value for the ten-meter walk test in the experimental group was 30.41. The post-test value was 49.11 with 15 degrees of freedom at a 0.05 level of significance; the tabulated 't' value is 1.91, while the calculated’t’ value is 24.41, exceeding the tabulated value. In the control group, the mean for the 10-meter walk test was 25.77 pre-test and 29.14 post-test, also with 15 degrees of freedom at a 0.05 level of significance, where the tabulated 't' value is 2.26 and the calculated 't' value is 14.11, indicating statistical significance.
According to the independent "t" test result for the functional reach test, 2.55 for 26 degrees of freedom at the 0.05 level of significance, and the critical table value, 2.04, there is no significant difference in either group.

Discussion

There are various unique obstacles associated with hemiplegic gait, which is commonly observed in patients who have experienced a stroke or other brain traumas. The primary issues consist of: Asymmetry: One side of the body is affected by hemiplegia, which causes asymmetrical movement patterns. Because the affected side is usually weaker or paralyzed, the person tends to compensate with the unaffected side, which results in an irregular stride and uneven weight distribution. Spasticity: An individual may find it challenging to move their limbs freely due to increased muscular tone (spasticity) on the affected side. This frequently causes jerky, stiff motions, and the leg on the affected side may remain extended, making it challenging to walk normally. Foot Drop: When the foot drags during the swing phase of gait, it can be caused by weakness in the ankle dorsiflexors. In order to clear the foot, this may force the person to elevate their hips (circumduction gait). Reduced Arm Swing: When walking, the arm on the afflicted side might not swing normally. Balance problems are exacerbated by this decrease in arm swing or by its total absence. Stability and Equilibrium Problems: People with hemiplegia frequently experience difficulties with balance and coordination, which makes it challenging for them to walk steadily. Fall danger is raised by this. Reduced Step Length: On the afflicted side, the person may take shorter steps to lessen instability. This results in a less fluid, sluggish, shuffling walk. Hip Hiking: People may raise their hips on the afflicted side in an effort to gain ground during the swing phase, which results in an atypical and ineffective gait. Compensatory Movements: People frequently adopt compensatory behaviors, such as leaning to one side or twisting their trunk excessively, to deal with the impairments on the affected side. Over time, these behaviors can result in secondary musculoskeletal issues.

Interventions Therapeutic: Exercises for gait training are essential in the treatment of hemiplegic gait. These workouts target particular gait irregularities in an effort to improve the person's ability to walk. They are frequently combined with other therapies, such as spasticity reduction methods and orthotic devices.

The restoration of gait symmetry is one of the specific objectives of gait training for stroke patients. When receiving single-limb support, most stroke patients have asymmetrical walking patterns and spend less time on the affected leg than on the sound leg. When hemiplegic participants were compared to normal subjects, they generally showed poor gait speed, cadence, and high gait cycle duration. Numerous academic studies indicate that there is a strong correlation between an increase in gait speed and an improvement in walking ability in stroke survivors.

The study focus: The individuals' balance, gait speed, and gait cycle duration were all shown to be low compared to the hemiplegic gait. Stroke patients who have an improvement in their gait speed often report an improvement in their walking capacity, according to many studies. This study's findings corroborate this perspective and demonstrate notable enhancements in gait speed, balance, and cadence. The experimental group's mean difference in gait speed was 19.47, whereas the control group's was 5.36. This is only a little change, but it has a big impact in the clinic. Repetition of the coordinated actions of the hip extensor, knee flexor, and ankle dorsiflexion while walking backwards may have helped break the limb synergy pattern and improve neuromuscular control,

which may explain the notable improvement in gait speed and other walking abilities. A considerable improvement in balance is also seen. One probable explanation is that when you move backward, you eliminate visual causes. When faced with such a challenge, the subject's abilities are significantly boosted since they are compelled to rely on a different set of receptors, such as their proprioception, kinesthetic sense, defensive reflex, and neuromuscular control. Results show that traditional training for backwards walking is effective. Despite concerns raised by certain research about the safety of individuals walking backwards, the results showed that no one fell. One probable explanation is that a backward walking training program was gradually introduced in a controlled setting.

Conclusion

According to the study's findings, stroke patients' functional balance and gait velocity significantly improve after receiving reverse walking intervention.

In this short-term trial, only MCA stroke patients were considered to participate, and there were age limits placed on the participants. An additional study could be carried out in the future with a larger population and a greater number of therapies in order to investigate a more effective intervention for gait improvement that is supported by evidence.

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