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EFFECT OF SLOW REVERSAL TECHNIQUE ON THE CADENCE IN HEMIPARETIC STROKE PATIENTS

Physiotherapy

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ABSTRACT

The purpose of the study is to determine the effect of slow reversal technique on the cadence in hemiparetic stroke patients. An experimental study was carried out with 24 patients with age group 35 to 55 years. Pre test neurological examination with gait assessment were taken. The patients received treatment sessions for a period of over 3 weeks with each session lasting for 10 minutes given 5 times per week. In post test patient's cadence was again recorded. Paired t test was used to determine the difference between pre & post test results. Conclusion: Slow reversal technique is significantly effective in improving the cadence of hemiparetic stroke patients.

KEYWORDS

Slow Reversal Technique, PNF (proprioceptors neuromuscular Facilitation), Hemiparetic stroke .

INTRODUCTION

STROKE:

Stroke, also known as cerebrovascular accident {CVA}, is the sudden loss of neurological functions caused by an interruption of the blood flow to the brain. This be due to ischemia (lack of blood flow) called as Ischaemic stroke can caused by blockage (thrombosis, arterial embolism), or a hemorrhagic resulting in leakage of blood in or around the brain and is refered to as hemorrhagic stroke. As a result, the affected area of the brain cannot function, which might result in an inability to move one more limbs on one side of the body, inability to understand or formulate speech, or an inability to see one side of the visual field it is the leading cause of adult disability in the united states and third largest cause of morbidity and mortality in India following cancer and cardiac diseases.[1,6]

Ischaemic stroke is the most common type and results in neurological deficits which typically persist atleast for 24 hours. motor deficits are characterized by paralysis i.e HEMIPLEGIA or weakness i.e HEMIPARESIS, typically on the side of the body opposite the side of the lesion.[1,6]

Hemiparesis is a condition which is characterized by muscular weakness or partial paralysis of one side of the body post stroke. It is less severe form of hemiplegia. It is the one key symptom of the stroke or embolic stroke are mainly responsible for occurrence of Hemiparesis.[1]

People who experience hemiparesis can have difficulty moving their legs and arms, walking and might also have a loss of balance. Due to this, performing everyday activities such as toileting, grabbing, objects, going to market, dressing, eating, and walking becomes difficult to execute.[1,2,3]

Various physical therapy approaches have been incorporated in the treatment of patients suffering with stroke, improvement of the quality of gait is often one of the patients suffering with stroke, improvements of the quality of gait is often one of the major goal of physical therapy for such patients respectively. Proprioceptive neuromuscular facilitation (PNF) is one approach commonly used to improve the gait of patients.[2,4]

PROPRIOCEPTIVE NEUROMUSCULAR FACILITATION:-

PROPRIOCEPTIVE: Having to do with any of the sensory receptors that give information concerning movement and position of the body.

NEUROMUSCULAR: Involving the nerves and muscles.

FACILITATION: Making easier.

According to Kabat, the underlying philosophy of Proprioceptive neuromuscular facilitation is that all human beings, including those with disabilities, have untapped existing potential. In keeping with this philosophy, there are certain principles that are basic to PNF.

1. PNF is an integrated approach: each treatment is directed at a total human being. Not at a specific problem or body segment.
2. The treatment approach is always positive, reinforcing and using that which the patient can do, an a physical and psychological level.
3. The primary goal of all treatment is to help patients achieve their highest level of function.

The basic procedure for facilitation are:-

1. Resistance: to aid muscle contraction and motor control, to increase strength, aid motor learning.
2. Irradiation and reinforcement: Use of the spread of the response stimulation.
3. Manual contact: To increase power and guide motion with grip and pressure.
4. Body position and body Mechanics: guidance and control of motion or stability.
5. Verbal (commands): Use of words and the appropriate vocal volume to direct the patient.
6. Vision: use of vision to guide motion and increase force.
7. Traction or Approximation: the elongation or compression of the limbs and trunk to facilitate motion and stability.
8. Stretch: the use of muscle elongation and the stretch reflex to facilitate contraction and decrease muscle fatigue.
9. Timing: promote normal timing and increase muscle contraction through “timing for emphasis”.
10. Patterns: synergistic mass movements, components of functional normal motion.

Proprioceptive Neuromuscular facilitation is an approach to therapeutic exercise that combines functionally based diagonal patterns of movement with techniques of neuromuscular facilitation to evoke motor responses and improve neuromuscular control and function. This widely used approach to exercise was developed by knott kabat and voss, their work integrated the analysis of movement during functional activities as the foundation of their approach to exercise and rehabilitation.[2,4]

The techniques used in PNF are:-

Rhythmic initiation, Reversal of Antagonists, Slow Reversal, Rhythmic Stabilization, Repeated Stretch, Contract-Relax, hold Relax, replication.

PNF techniques can also be used to develop muscular strength and endurance; facilitate stability, mobility, neuromuscular control and coordinated movements and thereby lay a foundation for restoration of functions. Hallmark of this approach to therapeutic exercise are the use

of diagonal patterns and the application of sensory cues specifically proprioceptive, cutaneous, visual and auditory stimuli to elicit or augment motor responses.[2,4]

Various PNF procedure have been used in the treatment of stroke depending on the affected site. Among these slow reversal techniques is focused in current study.

SLOW REVERSAL TECHNQUES:-

Slow reversal (SR) involves dynamic contraction of the antagonist slowly followed by dynamic contraction of the agonist. Slow reversal-hold (SRH) employs dynamic contraction followed by isometric contraction of the antagonist, finally followed by the same contraction sequence for the agonist.

This technique helps to increase strength of weak agonist muscles, active ROM develops coordination by smooth reversible movements helps to reduce fatigue of exercised muscle and increase endurance.[2,4]

CADENCE:-

Number of steps taken per minute is called as cadence. It is an important parameter in the analysis of gait of an individual. Cadence is measured as the number of steps per second or per minute. Cadence helps to determine the walking speed of a person.. A step frequency or cadence of about 110 steps per minute is considered as typical for adult men, typical cadence for women is about 116 steps per minute.[3,7]

METHODOLOGY

24 patients who have suffered from stroke between the age group of 35-55 years were selected on the basis of their admission. Each patient was screened initially by using simple selection proforma. Those who fulfilled these symptomatic criteria underwent a detailed Neurological examination. Hemiplegia due to secondary reasons other than stroke, other neurological conditions, Impaired higher cortical functions were excluded. The demographic data was collected from each patient. All the patients received treatment sessions for a period of over 3 weeks with each session lasting for 10 minutes for 5 times per week. Slow reversal technique was performed on the affected lower limb.

The therapist resisted the patient's affected lower limb in one direction which was the stronger or better direction.

1. As the end of the range of motion approached the therapist reversed the grip on the distal portion of the moving segment and gave a command to prepare for the change of direction.

2. At the end of the respective movement the therapist gave the action command to reverse direction. Without relaxation and the resistance was given to the new motion starting with the distal part.

3. When the patient began moving the limb in the opposite direction the therapist reversed the proximal grip so all the resistance opposed the new direction.

The reversal of the leg was performed in diagonal pattern i.e flexion and adduction of the leg with knee flexion into extension and abduction with knee extension. The resistance was given first to the flexion adduction component then the distal grip was changed and motion into extension abduction was started and the extension abduction components was resisted in this motion. This technique was carried on for 10 minutes duration for 5 days a week for total 3 weeks. Post test measurement: After the last treatment session, the patient's cadence was again recorded. Paired t test was used to determine the difference between pre & post test results

DATA ANALYSIS

Manual entry of the data was done on a pre-planned format. Individual record of each subject was noted in his own form. Data was statistically analyzed using statistical software.

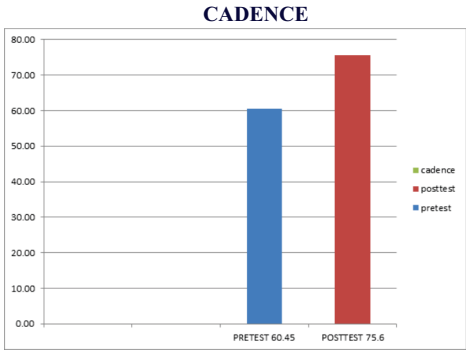
PARAMETERS	RESULTS (MEAN)	STANDARD DEVIATION
AGE	43.54	± 4.38

STASTISTICAL ANALYSIS

Paired t test was used to determine if there was a significance difference in the post test results.

	CADENCE	T VALUE	P VALUE
PRETEST	Mean= 60.45 S.D= ± 6.965	18.22	<0.0001
POST TEST	Mean= 75.60 S.D= ± 7.439		

GRAPH: comparison within the group pretest v/s posttest.



NOTE- This graph shows in a study of 24 patients with mean age 43.54 the mean cadence before the treatment sessions were found to be 60.45 and after the 3 weeks of treatment sessions with slow reversal technique the mean cadence was found to be 75.6**.**

RESULT

The collected information was tabulated and analyzed by using appropriate analysis tools.

If patients both male and female having mean age 43.54(SD=±4.38) who were diagnosed of having hemiparesis within 2 months following the stroke were selected.

In this study the pretest and posttest effect of slow reversal technique on the cadence of the hemiparetic patient that is within group comparison was done using paired t-test.

Cadence pretest was found to be 60.45(SD=±6.965)
Cadence posttest was found to be 75.60 (SD=±7.439)

T value=18.32 and P value found to be less than 0.0001 which is highly significant.

DISCUSSION

This study was designed to determine the effects of slow reversal technique of PNF on the cadence of hemiparetic stroke patients. It was an experimental study carried out at Dr. Ulhas Patil College of Physiotherapy, Jalgaon.

In this study, 24 hemiparetic patients within two months following the stroke with the mean age of 28.8 were selected. Out of these patients there were 13 males and 11 females. All the patients cadence was assessed on the first day of examination after which they underwent 3 weeks treatment session which consisted of slow reversal technique given to the affected lower limb with both d1 and d2 patterns for 20 minutes for 5 days per week. At the end of last treatment session, cadence of the respective patients were evaluated.

The results showed that there was improvement in cadence of the patients following the treatment protocol of slow reversal technique. This improvement in the cadence was seen as a result of the strengthening of the week muscle resulting due to paresis and due to improvement in the walking pattern of the patient. Improvement in walking ability provide people with opportunities to participate more easily in the community.

The ability to walk independently is a prerequisite for many daily activities. On discharge from rehabilitation programs. 60%to80% of people post stroke can walk independently with in efficient speed. Many people returning home after stroke rehabilitation walk at average speeds that insufficient to cross the street safely or even to walk safely in the community. So it is important to identify treatment

approaches that maximize community ambulation. Various approaches to stroke rehabilitation have been studied to improve the walking ability of people with hemiparesis. Cadence is one parameter which helps to determine the walking speed of an individual. For normal cadence it is important to have proper and complete gait cycle .normal gait occurs with the lower limb propelling in diagonal directions. Slow reversal technique helps to improve the strength of the muscles in functional pattern also it helps in training the lower limb in the functional diagonal movement pattern which is required for normal gait. It is also evident that the technique is based on the basic principle of successive induction, which explains that 'increased excitation of the agonist against muscle following stimulation of their antagonist'. This technique is thus helpful as there i activation of truth group of muscle which is required for highly coordinated activity i.e gait.

Many studies have been conducted so far to scrutinize the effect of various approaches in improving of the gait of patients following stroke. Although many studies focus on the improvement of the gait of hemiparetic patients. Amongst such studies PNF techniques are incorporated as a whole treatment procedure but no significant study has been done which utilizes the slow reversal in isolation in the treatment and observe its effect in improving the gait of such patients. It is Important to improve the patients functional independence as early as possible following the stroke so it is essential to incorporate the treatment procedure in practice for hemiparetic patients as it will help in improving their functional mobility.

This study showed not only improvement in the cadence of the hemiparetic stroke patients but also helped in improving their functional independent and quality of their gait and hence the slow reversal technique which is use in this study can be effectively incorporated for the treatment bin hemiparetic stroke patients.

CONCLUSION

It was concluded from this study that slow reversal technique is significantly effective in improving the cadence of hemiparetic stroke patients.

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