

Effect of Relaxation Therapy on Standing Balance and Mobility among Stroke Patients

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ABSTRACT

Motor impairment or unilateral weakness of the body, most commonly results from stroke in humans. Stroke is: 'Rapidly developing clinical signs of focal or global disturbance of cerebral function, due to ischemic or hemorrhagic injury.

The purpose of study is to describe the effect of relaxation therapy on standing balance and mobility among stroke patients.

Methods: - Study included 30 hemiplegic subjects divide in to two groups i.e, Group A (Experimental) and Group B (Control) randomly. A baseline assessment was done with outcome measures BBS and TUG test to obtain the pretest score of the subjects. After the pretest, all the subjects were undergone a therapeutic intervention. Participants in the experimental group received relaxation therapy earlier followed with conventional occupational therapy program for one hour of four sessions in a week with duration of total program for 6 weeks. The Participants in control group received only conventional occupational therapy program. After six weeks of intervention outcome measures were administered on both the groups to obtain the post score.

Results: This study suggests that relaxation Therapy with conventional occupational therapy can improve standing balance and mobility among stroke patients. The mean value of Berg balance scale, pre and post scores are, 42.866 and 49.733 respectively. The mean value of Time up & Go scale are, 27.094 and 15.930. On statistical analysis, the values were determined to be significant at 0.010 level for berg balance & 0.047 for time up & go scale (table 5) which supports the alternate hypothesis suggesting relaxation therapy improved standing balance and mobility among stroke patients (graph 1).

Conclusion:- This study concluded that relaxation therapy is effective in improving standing balance & mobility in Stroke patients

KEYWORD: Stroke, motor cortex, premotor cortex, Hypertonicity, Relaxation techniques, spasticity, Modified Ashworth Scale

INTRODUCTION

Motor impairment or unilateral weakness of the body, most commonly results from stroke in humans. Stroke is: 'Rapidly developing clinical signs of focal or global disturbance of cerebral function, due to ischemic or hemorrhagic injury to the motor cortex, premotor cortex, motor tracts or associated pathways in the cerebrum or cerebellum which may leads to Motor impairment, War low et al 2008, resulting disturbances of balance and mobility.

Balance is defined as the ability to maintain the projection of body's centre of mass within limit of base of support as in standing or sitting or in transit to a new base of support as in walking. It emerges from a complex interaction of the sensory and musculoskeletal system integrated and modified within the central nervous system in response to changing external & internal environmental condition, Horak et al 1985.

It is a prerequisite for all functional activities and depends on the integrity of the central nervous system. Risk factor identified that increases the risk of falling in stroke survivors includes generalized weakness, increased postural sway and uneven weight distribution in standing, less weight placed on hemiplegic gait, Hell strom et al 1999, impaired control of trunk mobility, Frank et al 1990, Strokes et al 2002.

The main cause of balance disturbances after stroke is the CNS lesion, which affects information processing and integration of sensory input as well as the effector pathways. These includes muscle weakness, abnormal muscle tone with stiffening of joints, shortening of muscle fibre with loss of range of motion, distorted proprioception, Sarah F Tyson et al 2006.

Mobility impairment following stroke has been related to various physical factors, such as motor recovery, balance

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ability, leg muscle strength and spasticity. Due to spasticity the hyperactive reflexes increases resulting difficulties to clear the ground during swing phase, Louise Ada et al 1998.

Spasticity is common after stroke can make movement, posture balance difficult and affect the ability to move one or more of your limb, or to move one side of the body, Bipin B Bhakta et al 2015.

Stretching, shortening and isometrics may effective in this dysfunction. A high gamma gain or activity can increase afferent input and spindle discharge, which results from traumas such as sudden overloading or overstretching. These events can result in greater muscle contraction or resistance to lengthening. The intrafusal-extrafusal fibre disparity increases afferent input, which stimulates the extrafusal fibres to contract the muscle in an effort to quiet the spindle. The gamma system may be between the signals for further muscle contraction, even when the muscle is shortened beyond its resting length. It was the major determinants of motor dysfunction.

Much effort has been directed at reducing hypertonicity as part of treatment & rehabilitation of brain damaged patient (Bobath 1970) such as, a frequently stated goals of the neuro developmental treatment approach is the achievement of normalization of hypertonicity.

Hypertonicity or Contractile tension in voluntary muscle is reduced by muscular relaxation or it signifies release of tension and lengthening of muscle fibre, as opposed to shortening which accomplish muscular tension or contraction as a result relaxation techniques can increase range of motion, particularly in the presence of abnormal muscle tone or spasticity, voss lonta Myers, 1985.

Relaxation techniques, which favour ease of motion and approximation of involved muscles, can decrease the intrafusal-extrafusal fibre disparity. These techniques are thought to reset and quiet the system by decreasing the afferent input through the gamma loop. The result is more normal resting length of the muscles and decreased disparity between the intrafusal-extrafusal fibres. These favours lengthening and relaxation of the hypertonic muscles and decreases the facilitation of the targets spinal segment.

Progressive muscle relaxation [PMR] is a relaxation technique focused on tensing and releasing tensions of the different muscle groups. It is simply that of isolating one muscle group at a time, then intentionally creating muscle tension for 8-10 seconds, and then allowing the muscle to totally relax so as to release the tensions, Bernstein et al 1973. Also relaxation technique reduce spasticity which include rhythmic movement initiation, contract relax, rhythmic rotation, movement reproduction, combination of isotonic contraction, Ray Yau Wang et al 1994.

The relation between spasticity and walking performance in stroke patients are conflicting. Some reported that there are no relation between spasticity and gait speed. In other researches, the relation was found between spasticity and gait speed. Zorowitz et al 2002.

Abnormal muscle tone is limitation in controlling balance and mobility is currently under considerable debate in the

literature. studies have done on the relationship between tone and function but no studies has analysed the relation between relaxation therapy and its effects on standing balance and mobility of among stroke patients.

Therefore, this study attempts to highlight the effect of relaxation therapy on hypertonicity and their effect on standing balance & mobility in stroke patients.

AIMS AND OBJECTIVES

To investigate the effect of relaxation therapy on standing balance and mobility among stroke patients.

HYPOTHESIS:-

There is significant improvement in standing balance and mobility after using relaxation therapy along with conventional occupational therapy programme in stroke patients.

NULL HYPOTHESIS:

There is no significant improvement in standing balance & mobility after using relaxation therapy along with conventional occupational therapy program in stroke patients.

METHODOLOGY

STUDY DESIGN:

The research design for this study was a Pre and post test experimental group design.

SUBJECTS AND SETTINGS:

A total number of 30 hemiplegic subjects fulfilling the inclusion criteria were randomly selected from SVNIRTAR, Department of Occupational Therapy for the study over a period of 6 weeks. Their eligibility was confirmed by discussing the information in the "purpose and aim of study" section in the consent form (Appdx no- 1).

INCLUSION CRITERIA:-

- Hemiplegic (both rt. & Lt. Side presentation)
- Both gender
- Hypertonicity in lower limb (MAS +1 to 2)
- Able to follow simple commands
- Able to stand & walk on even surface for few steps independently
- Person with hemiplegia due to CVA more than 3 month
- Age within 30-60 yrs.

EXCLUSION CRITERIA:-

- Other neurological & orthopedic disorder
- Musculoskeletal disorder
- Visual impairment
- Perceptual and cognitive deficits

INSTRUMENTATION: Modified Ashworth Scale

OUTCOME MEASURES:-

- Berg Balance Scale
- Time Up & Go Scale (Appdx No-IV):-

APPARATUS USED:-

- Stop watch,
- Measuring tape,
- Wooden chair without arm rest.

PROCEDURE

A total of 30 hemiplegic patients fulfilling the inclusion criteria were taken from SVNIRTAR Department of occupational therapy for the study. They were diagnosed as stroke by the physicians followed by Department of Occupational therapy. The patients were explained the purpose of study and were requested to participate followed by the obtainment of consent form. Modified Ashworth scale (MAS) were used to assess the muscle tone of all subject. The selection of subject was done by convenient sampling and then divided in to two groups that is Group A (Experimental) and Group B (Control) randomly. A baseline assessment was done with outcome measures BBS and TUG test to obtain the pretest score of the subjects.



FIG.1- MAS, TESTING OF KNEE



FIG.2- Subject performing Time up & Go test

After the pretest, all the subjects were undergone a therapeutic intervention aimed to reduce muscle tone. Participants in the experimental group received relaxation therapy earlier followed with conventional occupational therapy program for one hour of four sessions in a week with duration of total program for 6 weeks. The Participants in control group received only conventional occupational therapy program. After six weeks of intervention outcome measures were administered on both the groups to obtain the post score. A dairy was maintained documenting the exercise date of each session.

INTERVENTION STRATEGIES:

All the subjects were undergone a therapeutic intervention aimed to normalize muscle tone. Therapy was done for 6 week, four sessions per week, 1 hour duration. Following intervention strategies was used to normalize muscle tone and improve balance and mobility.

Relaxation techniques:

- Progressive muscular relaxation
- Rhythmic initiation
- Rhythmic rotation



FIG. 3- Administered Rhythmic Rotation on subject

Conventional occupational therapy program:

STRENGTHING ACTIVITIES:-

- Strengthening activities of lower limb by bicycle fretsaw.
- Leg muscle strengthening by using theraband.

STANDING ACTIVITIES:-

- Sit to stand & standing with eye open & closed.
- Picking up object from floor in standing position.
- Reaching with one hand in standing to the different direction.
- Standing on one leg, stand on heel, turning in a circle.
- Stepping forward, backward, sideways over obstacles.

WALKING ACTIVITIES:-

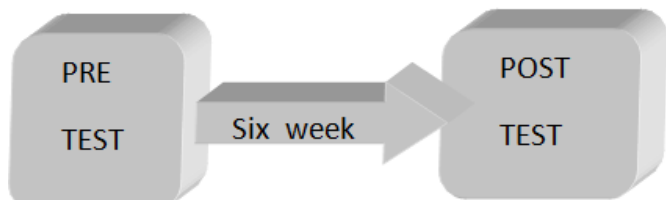
- Walking forward, backward, sideways.
- Stair climbing



FIG.4- Subject performing reaching with one hand in standing to the different direction

DATA COLLECTION

Data collection procedure requires 30 to 40 minutes. The data collected were transcribed onto a data sheet for each subject separately.



version 16.0 package. Statistical tests were carried with the level of significance set at $p \leq 0.05$.

The raw scores of pre intervention and post intervention of the outcome measures (Berg balance scale & Time up & Go scale.) were added and summed up into final scores. As this was 2- tailed, non parametric study, the changes in all the two outcome measures within control and experimental groups were analyzed using Wilcoxon Sign Ranks Test. Mann-Whitney U Test was performed for knowing the significance between the groups.

DATA ANALYSIS:

The Test parameters were compared before and after therapy. Statistical calculations were performed with SPSS

Table 1 Descriptive characteristics

S. No.	Baselines Characteristics	Group A (control)	Group B (experimental)
1.	No of subjects	15	15
2.	Age range (years)	34-60	30-59
3.	Mean age (\pm Std Dev.)	50.533(\pm 9.463)	46.933(\pm 8.572)
4.	Gender (M/F)	9/6	12/3
5.	Right /left hemiplegic	6/9	4/11

Table 2 Descriptive statistic of outcome measures

OUTCOME MEASURE	Mean test score(group A) CONTROL (N = 15)		Mean test score(Group B) EXP (N = 15)	
	Pre test	Post test	Pre test	Post test
Berg balance scale	35.800	42.866	39.733	49.733
Time up & Go scale	35.788	27.094	22.378	15.930

Table 3 Showing results of Wilcoxon Sign Rank Test for Berg balance scale within the groups

GROUPS	Mean diff.	z	p (2 -tailed)
CONTROL	7.066	-3.418	.001*
EXPERIMENTAL	10.000	-3.413	.001*

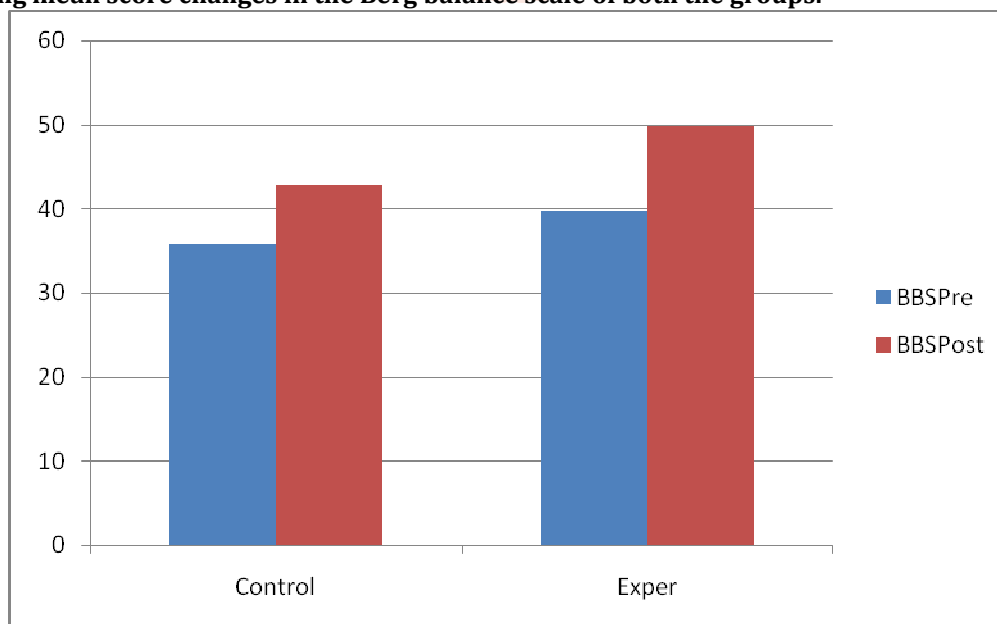
(* shows level of significance)

Table 4 Showing results of Wilcoxon Sign Rank Test for Time up & Go scale within the groups

GROUPS	Mean diff.	z	p (2 -tailed)
CONTROL	8.694	-3.408	.001*
EXPERIMENTAL	6.448	-3.408	.001*

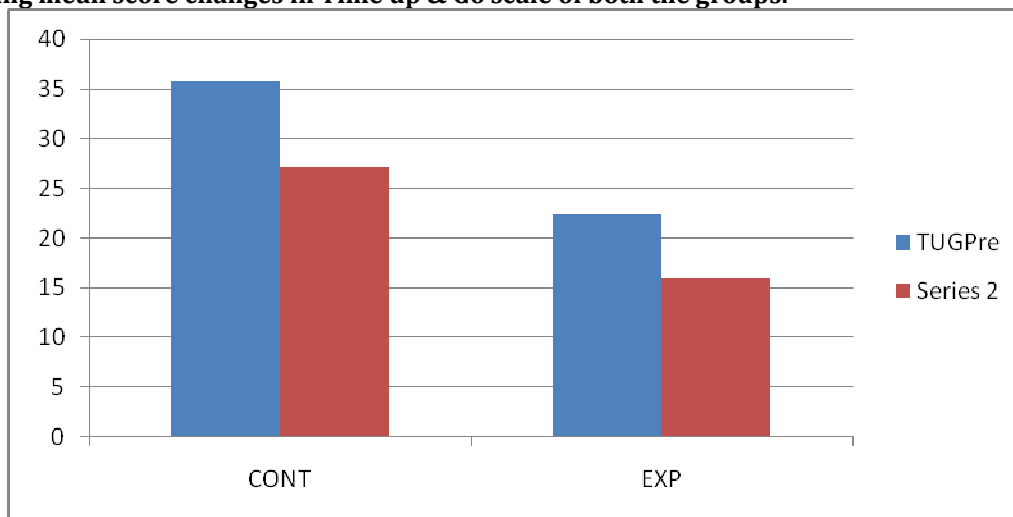
(* shows level of significance)

Graph 1: showing mean score changes in the Berg balance scale of both the groups.



Graph - 1

Graph 2: showing mean score changes in Time up & Go scale of both the groups.



Graph- 2

Table 5 Mann-Whitney U tests results between the groups.

OUTCOME MEASURES	MEAN DIFF.	z value	p value [2*(1-tailed)]
Berg balance scale	8.533	- 2.548	0.010 *
Time up & Go scale	7.558	-1.846	0.047 *

RESULT & DISCUSSION

The present study was designed to examine the effects of relaxation therapy on standing balance and mobility among stroke patients. This study suggests that relaxation Therapy with conventional occupational therapy can improve standing balance and mobility among stroke patients.

The imbalance and unstable trunk posture are believed to induce immediate increases in abnormal muscle tone. They reported that passive knee movements induced a decrease in spastic hypertonia in patients after stroke through a combination of reflexive and mechanical factors, concluded rhythmic movement that may change the properties of spastic muscle and soft tissue and also the neuronal excitation of the affected leg, Hsin-Chang Lo, Kuen-Horng (2009).

The mean value of Berg balance scale, pre and post scores are, 42.866 and 49.733 respectively. The mean value of Time up & Go scale are, 27.094 and 15.930. On statistical analysis, the values were determined to be significant at 0.010 level for berg balance & 0.047 for time up & go scale (table 5) which supports the alternate hypothesis suggesting relaxation therapy improved standing balance and mobility among stroke patients (graph 1).

The above results may also contribute to the fact that the relaxation technique used through sensory motor approach has a positive effect on hypertonicity, K walse (2001) these techniques are incorporated through Progressive relaxation Therapy programme.

As the client were advised to contract and relax the muscles during Progressive muscle relaxation programme, based on the principle of muscle physiology, the muscle has to relax whenever tension is being created in a muscle and then release. This happens because the muscle does not have a choice and it must react in this manner. The interesting part of this process is that the muscle will not only quickly relax back to its pre-tensed state, and when it is allowed to rest, the muscle will become even more relaxed that it was before

the tension was created. When this procedure of creating tension in the muscles and then releasing of the tension is applied to every major muscle group of the body, all of these muscles will become more relaxed prior to the beginning.

The main idea to initiating the relaxation response in this way is to take control of the voluntary muscles through creation of tension in them, followed by forcing them into a state of relaxation. When the body is aware of the presence of the tension, it will respond by triggering the muscles to relax, where the rest of the other components of the relaxation response will naturally follow Carin-Levey G et al, 2009.

CONCLUSION

Relaxation therapy is a promising area of research and can be efficiently used in clinical practice for treating stroke patients along with other convention therapy. It helps and enhances the pre requisite to perform a motor task, less motor exertion, a point that may be critical for the stroke population.

This study concluded that relaxation therapy is effective in improving standing balance & mobility in Stroke patients. It can be used as an adjunct to Conventional Occupational Therapy so that a holistic approach of treatment of the stroke survivors can be done by Occupational Therapist.

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