International Journal of Health Sciences and Research
Vol.13; Issue: 6; June 2023
Website: www.ijhsr.org
ISSN: 2249-9571

Original Research Article

A Comparative Study of PNF Technique with Cognitive Behavioural Therapy and PNF Technique Alone on Gait and Balance in Stroke

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ABSTRACT

Background and Purpose: A abrupt, particular neurological deficiency is the result of a stroke, also known as a cerebrovascular accident (CVA). The neurological deficit's abruptness, which can last for a few seconds, minutes, hours or even days, is what distinguishes the condition as vascular. Although hemiplegia may be the most obvious sign of a CVA and a major concern of therapists, other symptoms are equally disabling, including sensory dysfunction, aphasia or dysarthria, visual field deficits and mental and intellectual impairments. Aim of the study is to compare the effectiveness between the PNF Technique with Cognitive behavioural therapy and PNF Technique alone on gait and balance in stroke.

Method: Samplings of 45 subjects are randomly selected divided into three groups. Group A, Group B and Group C with 15 subjects in each. A subject in Group A receives PNF Technique with Cognitive Behavioural therapy, Group B receives PNF Technique alone and Group C receives Conventional therapy. The gait and balance were assessed by Functional gait assessment scale and Berg balance assessment scale.

Results: The study concludes that there was statistically significant improvement in Group A compared to Group B and Group C in response to treatment.

Conclusion: Based on the statistical result, this study concluded that proprioceptive neuromuscular facilitation with cognitive behavioural therapy was effective than PNF technique and Conventional therapy in stroke.

Keywords: PNF Technique with cognitive behavioural therapy (CBT), Proprioceptive neuromuscular facilitation (PNF), conventional therapy (CT), Functional gait assessment scale (FGA), Berg balance assessment scale (BBS).

INTRODUCTION

A abrupt, particular neurological deficiency is the result of a stroke, also known as a cerebrovascular accident (CVA). The neurological deficit's abruptness, which can last for a few seconds, minutes, hours or even days, is what distinguishes the condition as vascular. Although hemiplegia may be the most obvious sign of a CVA and a major concern of therapists, other symptoms are equally disabling, including sensory dysfunction, aphasia or dysarthria, visual field deficits and mental and intellectual impairments. The specific combination of these neurovascular defects allows the doctor to identify both the location and size of the defect. CVA's can be classified according to pathological type – thrombosis, embolus or hemorrhage – or by temporal factors – completed, in-

evolution, or Transient Ischemic Attacks (TIA). The annual incidence in the UK varies regionally between 150 – 200/100000, with a prevalence of 60/100000 of which one – third are severely disabled. Better control of hypertension, reduced incidence of heart disease and a greater awareness of all risk factors have combined to have reduce mortality from stroke. Despite this, stroke still ranks third behind heart disease and cancer as a cause of death in a affluent societies. Although the incidence of cerebrovascular disease has been decreasing for the last 25years, stroke is still the third most common cause of death in the US. Cerebral infarction (thrombosis or embolism) is the most common form of stroke, accounting for 70% of all strokes. Bleeding accounts for another 20% and 10% remain undetermined. An idea of the prevalence of stroke can be gained by looking at the results of the study of three states: Of every 100 persons who survive a stroke, 10 return to work without impairment, 40 have mild residual disability, 40 are disabled and require special services, and 10 need institutional care. The three most commonly recognized risk factors for cerebrovascular diseases are hypertension, diabetes mellitus, and heart disease. The most important of these factor is hypertension .[1]

One of the main contributing factors to cerebrovascular disease is atherosclerosis. It is characterized by the development of plaque on artery walls with an accumulation of lipids , fibrin , complex carbohydrates and calcium deposits , which causes blood arteries to gradually shrink. Risk factors that have been correlated to stroke include increased blood fat levels, obesity, and cigarette smoking. Because high blood pressure is the greatest risk factor for stroke, human characteristics and behavior that increase one's blood pressure will increase the risk of stroke. Due to demographic changes and improved by the rising prevalence of the key modifiable risk factors resulting early death and disability in low-income and middle-income countries.[2]

Hemorrhagic strokes neurological complications and Associated conditions are ,seizures, disorders of Speech and Language .[3] (I. Aphasia, 1.Fluent aphasia, 2.Non –fluent, 3.Global , II.Dysarthria) , Perceptual dysfunction , Dysphagia , Altered emotional status , Cardiovascular and pulmonary dysfunction , DVT and pulmonary embolus. The incidence rate of dysphagia was relatively high . The long-term outcome was favorable.[4] Depressive symptoms are frequent and they often have a chronic course. Depression is associated with stroke severity and functional impairment and with the male sex at 18 months. Attention should be focused on the long-term prognosis of mood disturbances and adaptation.[5] Late medical complications of stroke occur weeks to months after discharge from hospital. Years after the acute stroke, these issues continue to occur in some stroke survivors. The immediate clinical consequences of the stroke are complicated by a variety of lesser-known medical, musculoskeletal and psychosocial difficulties like post – stroke seizures, urinary incontinence, spasticity and hypertonicity, emotional lability .[6] With the primary focus on depression and anxiety disorders, cognitive behavioural therapy is a psychosocial intervention that seeks to lessen the symptoms of a variety of mental health diseases. Five components of CBT are, developing an individual case formulation, session structuring, activity scheduling, thought record, schema change method. Example of CBT, Exposing yourself to situations that cause anxiety, like going into a crowded public space. Keeping a daily journal where you write down your ideas and how they make you feel. Balance problems Is one of the major challenge in stroke rehabilitation, this CBT helps to reduce the fear of imbalance .[7] This CBT also helps to cross over emotional disorders after stroke. Because stroke can lead to significant emotional disorder .[8] Behavioural and cognitive behavioural psychotherapies are proven in the treatment of anxiety in general population .[9]

Proprioceptive neuromuscular facilitation focus on the three things increase motor learning of the agonist through repetition of an activity (repeated contractions) and rhythmic initiation, reverse the motor patterns of the antagonists, two techniques are slow reversal and rhythmic stabilization both used in isometric contraction. Pattern of movement associated with PNF are composed of multijoint, multiplanar, diagonal and rotational movements of the extremities, trunk and neck. PNF improve the ADL quality of life of individuals with stroke .[10] PNF is effective in improving balance, strength and mobility and also slightly reduces the chance of falls .[11] In the treatment of chronic stroke rehabilitation, PNF may improve gait speed and balance .[12]

METHODS
The study was conducted at outpatient department in JKKMMRF College of physiotherapy and sure trust, Komarapalayam. A sample of 45 patients with in the age group of 57-70 years with stroke were randomly divided into three groups. A total number of 45 subjects were selected by random sampling method after due to consideration to inclusion criteria. They were divided into three groups. Group A, Group B and Group C with 15 subjects in each group. Group A received proprioceptive neuromuscular facilitation with cognitive behavioural therapy, Group B received proprioceptive neuromuscular facilitation and Group C received conventional therapy in addition to selected physiotherapy programme for a total duration of 4 months for 35 to 50 minutes for each training for 5 days / week. The parameter used for the study was berg balance scale and functional gait assessment scale, both males and females are included in the study, exclusion criteria of unstable cardiovascular conditions, haemorrhagic patients, embolism, age above 71 years, recent fractures, DVT, obesity, visual and auditory problems.

PROCEDURE
GROUP A – PNF TECHNIQUE WITH COGNITIVE BEHAVIOURAL THERAPY
PROTOCOL – GROUP A

POSITION	EXERCISE	REPETITION
GAIT TRAINING (PNF)SITTING	Standingdown up and sitting	10

STANDING	One leg standing	10
	Weight shifting	
	-forward	10
	-backward	10
	Repeated stepping	
	-Forward	10
	-Backward	10
	-Sideways	10
WALKING		
WALKING 1st and 2nd week	Forward	3mins cont
	Backward	3mins cont
	Sideways	3mins cont
OTHER ACTIVITIES 3rd and 4th week	Braiding	10
	Walking outside the bars	3mins cont
	Going up and down stairs	5mins cont
	Going up and down a curbs	3mins cont
	Going down and getting up from the floor	10
CBT	Identifyingnegativethoughts Goal – setting and follow upPracticing Self monitoring	

GROUP B - PNF TECHNIQUE
PROTOCOL – GROUP B

POSITION	EXERCISE	REPETITION
GAIT TRAINING (PNF)		
SITTING	Standing up andsitting down	10
STANDING	One leg standing	10
	Weight shifting	
	-forward	10
	-backward	10
	Repeated stepping	
	-Forward	10
	-Backward	10
	-Sideways	10
WALKING		

WALKING 1st and 2nd week	Forward	3mins cont
	Backward	3mins cont
	Sideways	3mins cont
OTHER ACTIVITIES 3rd and 4th week	Braiding	10
	Walking outside the bars	3mins cont
	Going up and down stairs	5mins cont
	Going up and down a curbs	3mins cont
	Going down and getting up from the floor	10

GROUP C – CONVENTIONAL THERAPY
GROUP C – PROTOCOL

POSITION	EXERCISE	REPETITION
Lying (head raised) (Frenkel's)	Hip abduction and adduction	10
	One hip knee flexion and extension	10
	One leg raising to place heel on specified mark	10
	Hip and knee flexion and extension, abduction and adduction	10
Sitting (Frenkel's)	One leg stretching, to slide heel to a position indicated by a mark on the floor	5
Stride sitting (Frenkel's)	Change to standing and then sit down again	10
Standing	Single leg standing	10
	Single leg standing side legraise	10
	Balance board	3mins(cont)
	Heel raise - holding on	10
	-not holding onSide stepping	10
	Turn around (Frenkel's) Transference of weightfrom foot to foot	10
		10
Stride standing (Frenkel's)		10
Walking (Frenkel's)	Walking and changing directions to avoidobstacles	3 mins(cont)

RESULT
Descriptive statistic for functional gait assessment scale

	Group	Mean	Standarddeviation	N
FGA	PNF with CBT	8.8	1.0142	15
	PNF	5.6667	0.9759	15
Pre - test	CT	7.5333	1.0601	15
	TOTAL	7.333	1.6376	45
FGA	PNF with CBT	26.3333	1.6762	15
	PNF	15.1333	1.2459	15
Post - test	CT	17.3333	1.4475	15
	TOTAL	19.6	5.1053	45

In the descriptive statistic represent the pre - test and post – test mean value and standard deviation for Functional gait assessment scale. The pre – test mean value for Functional gait assessment scale was 7.333 and the pre – test standard deviation was 1.6376. The post – test mean value for Functional gait assessment scale was 19.6 and the post – test standard deviation was 5.1053.

RESULT DETAILS – Functional Gait Assessment scale (POST - TEST ANALYSIS)

Source	SS	Df	MS	
BETWEEN TREATMENTS	1056.4	2	528.2	
WITHIN TREATMENTS	90.4	42	2.1524	
TOTAL	1146.8	44		F =245.40266

The above table stats the result in the post - test analysis of functional gait assessment scale, for that sources are taken from between the treatments and within the treatments. The f – ratio value is 245.40266. The p – value is < .00001. The result is significant at p< .05.

Descriptive statistic for berg balance assessment scale

	Group	Mean	Standard deviation	N
BBS Pre – test	PNF with CBT	25.4667	1.4573	15
	PNF	16.8667	1.7674	15
	CT	26.4667	1.6417	15
	TOTAL	22.933	4.6388	45
BBS Post – test	PNF with CBT	51.5333	1.7674	15
	PNF	32.6667	2.6637	15
	CT	42	1.5119	15
	TOTAL	42.067	8.0408	45

In the descriptive statistic represent the pre - test and post – test mean value and standard deviation for Berg balance assessment scale. The pre – test mean value for Berg balance assessment scale was 22.933 and the pre – test standard deviation was 4.6388. The post – test mean value for Berg balance assessment scale was 42.067 and the post – test standard deviation was 8.0408.

RESULT DETAILS – Berg Balance Assessment scale (POST - TEST ANALYSIS)

Source	SS	Df	MS	
BETWEEN TREATMENTS	2669.7333	2	1334.8667	
WITHIN TREATMENTS	175.0667	42	4.1683	
TOTAL	2844.8	44		F =320.246

The above table stats the result in the post - test analysis of berg balance assessment scale, for that sources are taken from between the treatments and within the treatments. The f – ratio value is 320.246. The p – value is < .00001. The result is significant at p< .05.

DISCUSSION

The purpose of the study was to compare the proprioceptive neuromuscular facilitation and cognitive behavioural therapy, PNF technique and conventional therapy on gait and balance in stroke. The berg balance scale and functional gait assessment scale taken as the parameters to assess the gait and balance. The study sample comprised of 45 patients of which 15 group A, group B and group C, the age of the subjects was 57-70 years. Among the 45 subjects. 15 were treated with PNF and CBT, 15 were treated with PNF and 15 were treated with conventional therapy.

The Delowar Hossain Chowdhury conducted a study with proprioceptive neuromuscular facilitation for stroke survivors. He included a minimal population in the study number of twenty and measured them with a Wisconsin gait scale. The study concluded that Proprioceptive neuromuscular facilitation (PNF) exercise is statistically sound & effective on gait performance in ambulatory stroke patients and also he suggested the more number of patient's included in the study with PNF technique .[13]

The K Ward. S. evaluates study group with cognitive behavioural therapy for stroke survivors with depression and their carers. Participating stroke survivors and their carers complete assessment measures at

baseline, post-treatment and 1-month and 6-months follow-up. In the study of stroke survivors appears to have been effectively implemented and is acceptable to stroke survivors and carers .[14]

In the analysis and interpretation of FGA for Group A, Group B and Group C

The pre – test mean value of PNF with CBT for functional gait assessment scale was 8.8 and the post – test mean value of PNF with CBT for functional gait assessment scale was 26.3333. The pre – test standard deviation value of PNF with CBT for functional gait assessment scale was 1.0142 and post – test standard deviation value of PNF with CBT for functional gait assessment scale was 1.6762. The pre – test mean value of PNF for functional gait assessment scale was 5.6667 and the post – test mean value of PNF for functional gait assessment scale was 15.1333. The pre –test standard deviation value of PNF for functional gait assessment scale was 0.9759 and post – test standard deviation value of PNF for functional gait assessment scale was 1.2459. The pre – test mean value of CT for functional gait assessment scale was 7.5333 and the post – test mean value of CT for functional gait assessment scale was 17.3333. The pre –test standard deviation value of CT for functional gait assessment scale was 1.0601 and post – test standard deviation value of CT for functional gait assessment scale was 1.4475.

Between treatments of pre – test analysis for functional gait assessment scale SS value was 74.5333 and within treatments of pre – test analysis for functional gait assessment scale SS value was 43.4667. The f – ratio value is 36.0092. The p – value is < .00001. The result is significant at p< .05. Between treatments of post – test analysis forfunctional gait assessment scale SS value was 1056.4 and within treatments of post – test analysis for functional gait assessment scale SS value was 1146.8. The f – ratio value is 245.40266. The p – value is <.00001. The result is significant at p< .05

In the analysis and interpretation of BBS for Group A, Group B and Group C

The pre – test mean value of PNF with CBT for berg balance assessment scale was 25.4667 and the post – test mean value of PNF with CBT for berg balance assessment scale was 51.3333. The pre –test standard deviation value of PNF with CBT for berg balance assessment scale was 1.4573 and post – test standard deviation value of PNF with CBT for berg balance assessment scale was 1.7674. The pre – test mean value of PNF for berg balance assessment scale was 16.8667 and the post – test mean value of PNF for berg balance assessment scale was 32.6667. The pre –test standard deviation value of PNF for berg balance assessment scale was 1.7674 and post – test standard deviation value of PNF for berg balance assessment scale was 2.6637.The pre – test mean value of CT for berg balance assessment scale was 26.4667 and the post – test mean value of CT for berg balance assessment scale was 42. The pre –test standard deviation value of CT for berg balance assessment scale was 1.6417 and post – test standard deviation value of CT for berg balance assessment scale was 1.5119.

Between treatments of pre – test analysis for berg balance assessment scale SS value was 835.6 and within treatments of pre – test analysis for berg balance assessment scale SS value was 111.2. The f – ratio value is 157.80216. The p – value is < .00001. The result is significant at p< .05. Between treatments of post – test analysis for berg balance assessment scale SS value was 2669.7333 and within treatments of post – test analysis for berg balance assessment scale SS value was 175.0667. The f – ratio value is 320.246. The p – value is < .00001. The result is significant at p< .05.

CONCLUSION

The study concluded that proprioceptive neuromuscular facilitation technique with cognitive behavioural therapy was effective treatment for gait and balance in stroke and also berg balance assessment scale and

functional gait assessment scale could be used as the assessment tool for stroke.

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