"EFFECTIVENESS OF PELVIC PROPRIOCEPTIVE NEUROMUSCULAR FACILITATION ON QUALITY OF LIFE IN STROKE PATIENTS: A RANDOMIZED CONTROLLED PILOT STUDY"

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ABSTRACT

INTRODUCTION: Stroke is neurovascular disease caused by interruption of blood flow to brain, result in neurological deficit. Neurological deficits that lead to loss of leg strength and impaired quality of life are two factors that correlate to walking ability Post stroke people have more forward leaning posture with an anteriorly bent pelvis in standing. Facilitation of trunk control, therefore, is used to influence the extremities.

OBJECTIVE: To evaluate the effects of Pelvic Proprioceptive neuromuscular facilitation quality of life among stroke patients.

MATERIAL AND METHODOLOGY: All patients were screened as per inclusion and exclusion criteria. They were allocated into two groups (5 subjects in each), experimental group (Pelvic PNF + conventional intervention) and control group (conventional group) by using random sampling. Outcomes were measured using Stroke impact scale (SIS – v.3.0) was done before and after intervention, training was given for 5 days in a week for 4 weeks.

RESULT: The statistically analysis of data was performed by SPSS [v20]; the statistical significance is set up at $P < 0.05$, for using t-test for present study. The result shows that there is significant difference between the group mean values during 4 weeks of intervention period and outcome measurement indicates that the pelvic PNF along with conventional therapy was significant effective than conventional therapy alone on balance, gait performance, and quality of life among recovering stroke patients.

CONCLUSION: Pelvic PNF along with conventional therapy enhance functional performance, and quality of life among stroke patients.

KEY-WORDS: stroke patients, Stroke Impact Scale (SIS), Quality of life.

INTRODUCTION

The world health organization (WHO) defines stroke is: "Rapidly developing clinical signs of focal (or global) disorder of cerebral functions, with symptoms lasting 24 hours or longer or leading to death, with no apparent cause other than vascular origin" [(1)]. The devastating brain disorder includes cerebrovascular disease: ischemic stroke, hemorrhagic stroke, and cerebrovascular abnormalities like intracranial aneurysms and arteriovenous malformation (AVM). [(2)]

The frequency of stroke in India was 130/100000 people per year, according to W.H.O. (16 November 2011). The yearly incidence rate of stroke in India is 124/100,000, with a prevalence of 136/100,000 in urban areas and 165 per 100,000 in rural populations. The Indian medical research council estimates that, among non-communicable diseases, stroke contributes 41% of deaths and 72% of life-adjusted disability.[(3)]

Common problems after stroke are impaired motor functions including balance and gait, contralateral sensory impairment, altered tone of trunk muscles, abnormal synergy patterns, abnormal reflexes, altered coordination, and lack of postural control, and balance, perceptual deficits, cognitive limitations, visual deficits, aphasia and depression. Neurological deficits that lead to loss of leg strength and impaired balance are two factors that correlate to walking ability.[(4,5)]

In stroke patient loss control of the trunk muscle is frequently found because trunk control is the capacity of the trunk muscle to keep the body upright, adjust the weight change, and execute selective trunk motion to keep the COM within the BOS during steady and dynamic postural adjustments. [(6)] The stroke patient's shows reduce and delays within the muscle activity of paralytic trunk muscles [(7)]. The trunk is a part of pelvis which combinely support the extensors motion. The motion of pelvis occurs by the trunk muscles because the pelvis pattern is depend on the amount of trunk motion. [(6).]The trunk control play a major role in function of respiration. [(8)]. An adequate stability of trunk is required for balance and lower extremity use during activity of daily living and higher-level tasks.

In physiotherapy a variety of movement therapy approaches are available for retraining motor skills in adult patients with hemiplegia. Certain approaches like Proprioceptive Neuromuscular Facilitation, Brunnstrom, Bobath, and Rood's believe in reflex and hierarchical theories of motor control, while others like Motor Relearning Programme (MRP) and system theory approaches derive clinical implications from more recent theories of motor control and motor learning as well as from the principles of neural plasticity.[(9)] Plasticity is referred to as the inherent ability to cortical reorganize or develop new functional connections in response to learning and experience. It is the plasticity capacity within the cerebrum that enables the recovery of lost function after neuron loss and related functional connections.[(10)]

The pelvic PNF facilitates the trunk and lower extremity motion and also provide the stability of trunk. [(3)] It also promotes the exploration of postural reflexes and prioritizes eccentric muscle contraction, stimulating agonist activity. [(11)] Various PNF techniques had used, depending on the site of affection. Among these PNF is facilitation of pelvic movement to increase control of the pelvis. Because the pelvis has been represented as a "key point of control" for maintaining a gait pattern, techniques designed to affect the pelvis are widely used.[(10),(13),(14),(15)] Hemiparetic stroke patients with affected proprioception could not carry on balance and postures and have difficulties in performing motor control when their vision is blocked. [(16)]. Trunk stability of stroke patients is a main indicator in predicting their post-stroke quality of life.

The daily living activity involves potential to reach for a variety of objects located both within and beyond arm's length as personal daily tasks; it also entails activities such as showering, toileting and dressing. [(17,18)] Self-triggered arm movements were associated with anticipatory postural adjustments in muscles of the

trunk as well as lower limbs, indicating that postural adjustments always precede active movement. [19, 20] Ultimately, the lack of postural control can degrade the quality of life.

The PNF treatment approach follows the principle that motion control moves from proximal to distal regions of the body. Facilitation of trunk control, therefore, to sway the used of extremities. If this treatment principle is valid, increase control and strengthening "normal" pelvic movement should improve lower limb function. (21)

The Stroke Impact Scale (SIS) is a standardized scale of health-related quality of life in patient with stroke and measure the QOL in this study.[22] The Stroke Impact Scale (SIS) is a disease-specific, self-report questionnaire that evaluates disability and health related quality of life after stroke.[23] The ICC value of interrates reliability of stroke impact scale (VERSION 3.0) is 0.86 to 0.98.[24] It has been evaluated as a reliable, valid, and sensitive outcome measure for measuring meaningful functional outcomes and health related quality of life in stroke patients. To assess 18 domains: hand function, mobility, strength, activities and instrumental activities of daily living (ADL/ IADL), communication, emotion, memory and thinking, and participation.(22)

METHODOLOGY:

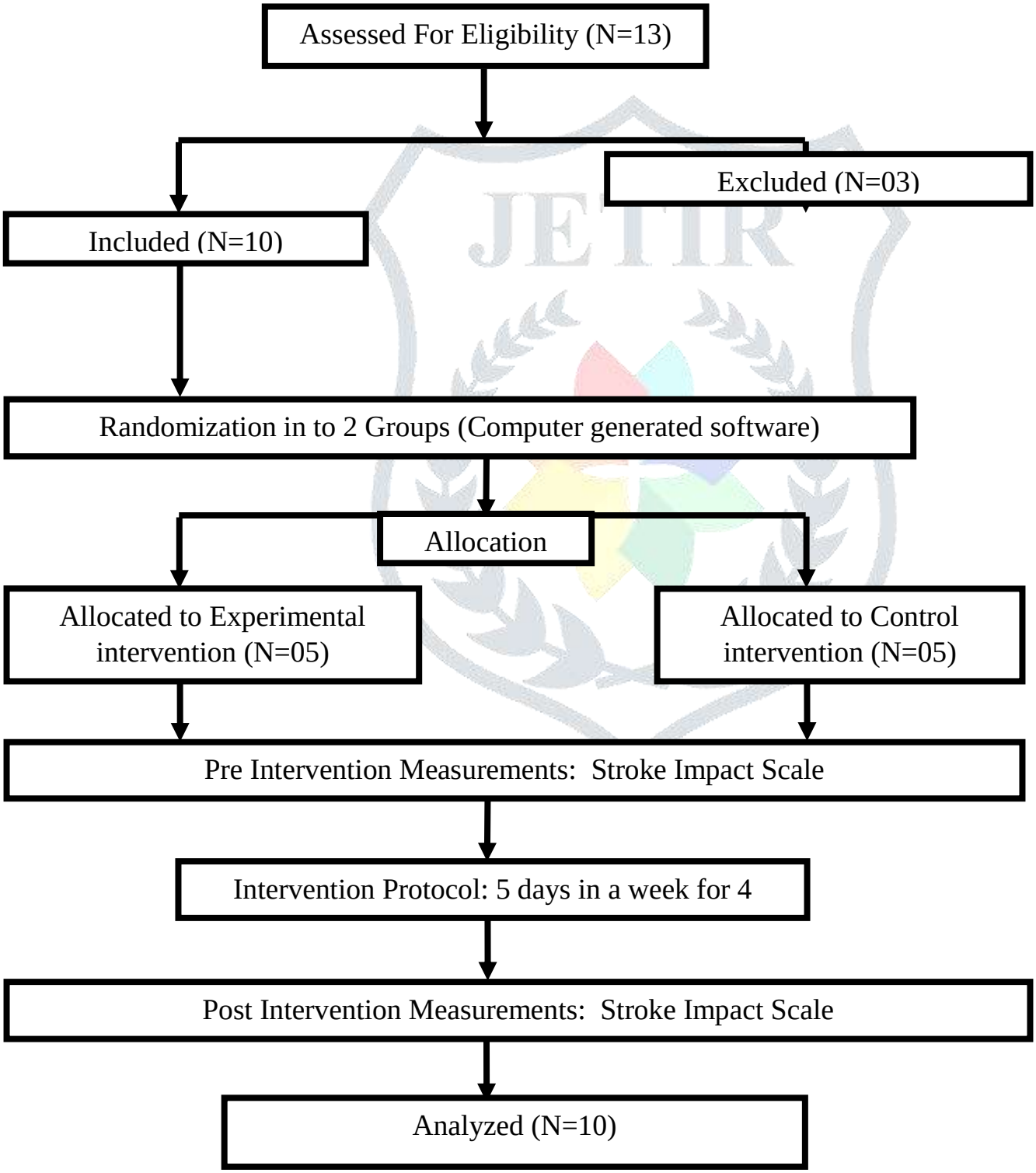
Study Design: Pilot Study
Population: Stroke patient
Sampling Technique: Selective sampling who fits in inclusion criteria.
Sampling Size: Sample size (N) = 10
Intervention Duration: 4 weeks (5 Days in a week).
Inclusion Criteria: Patients with 55-65 year of age, Stroke is confirmed by physician, Stroke duration within 6 months, unilateral stroke, Patients able to walk at least 10 meters with or without walking aids, Both male and female were included.
Exclusion Criteria: Medically unstable, Fracture of any lower limb bones, Impaired cognitive function, Any other Neurological condition.
Predictor and Outcome Measures: Stroke Impact scale (VERSION 3.0)
Procedure:

The studies were conducted with the prior permission of the hospital and people themselves, and after approval of the permission, the study will be conducted in the allotted time at physiotherapy OPD. A total of 10 Subjects having a stroke were selected in this study. All subjects were screened on the day one of the treatment, based upon the inclusion and exclusion criteria, based on the instruction of the investigator Selected subjects underwent Stroke impact scale administered on one by one, they were asked to do according to test instruction and result will be recorded. After screening, all subjects were given explanation about the present study in detail and a written consent was signed by each participant or patient relatives as a formality towards their willingness to participate. These values were taken before intervention was started as baseline data and at the completion of intervention as outcome measures, which were re-evaluated at the end of 4 weeks. After recorded the form, the collected information or data was used for further analysis of study and to interpret the outcome of the study. All the subjects (6 males and 4 females) were randomly allocated in to two groups i.e. Group I- Experimental group and Group II - control group. The allocation was carried out by the following computerized generating method for randomization by using research Randomizer Software, after all-inclusive criteria added. Subjects and therapist both were blinded for the grouping. First subject who fulfilled the inclusion criteria was allocated under Group I and the consecutive subject under Group II. Same procedure was followed for the rest of the available subjects.

EXERCISES PROTOCOL:

Selected patients were divided into 2 groups by using computerized generating research Randomizer Software, after all-inclusive criteria added. Before starting exercises, introduction about all exercises had been given. In Group A (Experimental Group) subjects belonging to this group were administered Pelvic PNF followed by and conventional therapy, In Group B (Control Group): subjects belonging to this group were administered conventional therapy. Both groups were treated with 5 days in a week for 4 weeks. Each treatment session lasts for 40-45 minutes.

Study Flow Chart:



GROUP A: PELVIC PNF + CONVENTIONAL THERAPY (Anterior Elevation, Posterior Depression, Conventional Therapy), The techniques used in this study were rhythmic initiation, slow reversal and agonist reversal. The sequence used was rhythmic initiation, slow reversal and agonistic reversal. Each sequence was performed for total of 10 minutes including the two minutes of rest interval in each sequence.

GROUP B: CONVENTIONAL THERAPY: Control group was received conventional physiotherapy in the form of truncal exercises, performed on the plinth. The exercises in supine: bridging; unilateral bridging; and the trunk rotation. The exercises in sitting: Flexion and extension of the trunk ; Trunk lateral flexion initiated from the shoulder and pelvic girdle , Rotation from the upper part of trunk; Rotation from the lower part of the trunk; and Shuffling the pelvis forward, backward and one side to other on a plinth. These exercises will be performed with the assistance initially if required and progressed to a state of no assistance. The exercises was performed both in the supine and in sitting positions, for total of 30 minutes including 6 minutes of rest period in between as per the patients requirement, once in a day, 5 days per week for 4 weeks.

RESULT

In thus study 10 patients with the age group of 40 to 60 years were taken and divided into two groups. Group A (Experimental Intervention) and Group B (Conventional Intervention).10 individuals completed the study program without any complications. Statistical Package for Social Sciences [SPSS] v20 (IBM, Corporation) was used for the data analysis. In table-1 mentioned of baseline data like age, gender, weight, height, dominant side.

TABLE 1: Age, Height, Gender Distribution of Group A and Group B

Groups	Age	Gender	Weight	Height	Dominant side
Group-A	52.7	Male-3 Female-2	61.7	154.4	Reight-4, Left-1
Group-B	52.9	Male-3 Female-2	62.5	155.2	Reight-4, Left-1

TABLE 2: Inter Group Comparison of SIS between GROUP A and GROUP B

Groups	N	Mean	Std. Deviation	P value
Group A	5	21.9800	5.00892	0.03
Group B	5	13.7220	5.46802	

As shown in Table 1, the baseline data of all subjects in both groups were similar & In Table 2 show the Comparison of pre and post mean of SIS, Paired t-test was performed for analysis, Pre test Mean ± SD value of SIS Group A and Group B was 37.38 ± 6.77 and 46.07 ± 6.78 respectively, when it was compared with the post test Mean ± SD value of SIS Group A and Group B 59.39 ± 5.73 and 59.79 ± 4.10 after 4 weeks of intervention respectively; the obtained T – value was finding had showed that there was a highly significant difference in Functional performance in pre test and post test values. ($P < 0.05$)

Statistical analysis indicated a significant improvement of the experimental group over the control group.

DISCUSSION

The approach PNF to treat using the principle which controls the movements continue from proximal to distal body area. So, this treatment pattern is valid, gaining control of and strengthening "normal" pelvic motions should improve lower limb function.[21] In this study we used stabilization of core muscles by pelvic PNF techniques. Pelvic PNF techniques function by promoting the neuromuscular means through utilization of stretch, application of specific movement patterns and effects of maximal resistance in sequence to induce irradiation. The effects are persistent with prior reviews where PNF has been used to improve trunk muscle control. This study hypothesized whether indirect effects for improving trunk stability produce distal mobility and control by aiming to evaluate the effect of pelvic PNF on quality of life and functional performance in stroke patient. The primary finding of present study were that 4 weeks of pelvic PNF exercises along with conventional therapy for stroke patients enhance significantly improve in QOL. These finding are strongly correlated with study performed by Kumar et al. stated that effects pelvic PNF has significantly effective on gait parameters and functional lower limb mobility in hemiparetic patients with post stroke duration of less than 6 months.[9]

The present study was carried out with the concept of strong correlation between pelvic and lower extremities including 10 stroke patients who were randomly divided in to two groups. For group I pelvic PNF along with conventional therapy, and for group II conventional therapy were administrated for 5 days in a week for 4weeks for determining effects on functional performance by using reliable and valid outcome measures like and Stroke Impact Scale (SIS).

According to Kabat, probable mechanism with the use of PNF to facilitate the neuromuscular mechanism, by stimulating the proprioceptors, and reported that a higher motor response can be achieved when using facilitating techniques in additionally to resistance. These facilitatory techniques may assist with encouraging movement and stability of trunk thus increasing the motor control and motor learning, thereby enhancing the participant's performance in post treatment group.[25]

Rosa Cabanas et al. have conducted systemic review on Trunk training exercises for improving trunk stability and sitting balance in patients with stroke and evaluated the literature on trunk training exercises in patients with stroke, to establish quality of life by using stroke specific quality of life questionnaire (SS-QOL) and stated that Trunk training exercises significant effective to improve balance and quality of life.[26] These finding similarly correlate with this study but in this study the quality of life measured by SIS (version:3) and result of study also shows that SIS score was significantly improve in patient who administrated pelvic PNF when compared with conventional therapy alone.

The specific pattern of pelvic PNF consist anterior elevation and posterior depression is an integral aspect when gait swing is considered. As this movement pattern of the pelvis is reinforced, it increases motor response and motor learning that occurs due the facilitatory techniques along with resistance thus leading to the improvement in the gait parameters. [27]

Thus, in the present study the intervention given in both the groups was shown to be effective, but the intervention given in Group A (Pelvic PNF + conventional therapy) was found to be more effective when compared to Group B (conventional therapy). Therefore, Pelvic PNF exercises are more effective in improving the QOL among stroke patients than conventional exercises treatment.

CONCLUSION

In present study the results showed that both Pelvic PNF along with conventional therapy and conventional therapy alone had significantly effective among recovering stroke patients but when results are compared, the group which received pelvic PNF along with conventional therapy improve quality of life in stroke patient.

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