



A Study to Assess the Effects of Proprioceptive Neuromuscular Facilitation of Trunk in Improving Trunk Balance of Patients with Stroke

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ABSTRACT

Stroke is a complex pathology with many clinical presentations with unique impairments and activity limitations. Physiotherapy has a massive impact on quality of life of a stroke survivor. Proprioceptive neuromuscular facilitation (PNF) is a rehabilitation technique used to stimulate the neuromuscular system in an effort to excite proprioceptors (sensory organs in muscles, tendons, bones, and joints) in order to produce a desired movement. It has a greater impact on trunk control. The aim of the study is to evaluate the effect of proprioceptive neuromuscular facilitation of trunk in improving balance of trunk in stroke patients. Twenty stroke patients within the age between 60 to 70 years, were recruited for study. All patients were assigned proprioceptive neuromuscular facilitation of trunk for 4 weeks. Pre and post test scores were analysed. Inclusion criteria are patients with 60-70 years of age of both the genders with stroke duration of at least 6 months. Exclusion criteria are recurrent stroke with severe spasticity, perceptual disorders and uncorrected vision problems, any symptomatic cardiac failure, patients with other neurological disorders or musculoskeletal problems, impaired cognitive function. Both pre-test and post-test measures were analysed statistically using the data analysis computed with SPSS. The outcome measures used is TIS. Statistical analysis showed significant improvement in trunk balance after the treatment of proprioceptive neuromuscular facilitation of trunk for 4 weeks in stroke patients. Result showed significant improvement in the PNF treatment in trunk balance after the treatment of proprioceptive neuromuscular facilitation of trunk. The study concluded that the trunk balance can be improved in stroke patients after performing the proprioceptive neuromuscular facilitation of trunk for 4 weeks.



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INTRODUCTION

Stroke is also referred as a cerebrovascular accident with clinical signs of cerebral dysfunction, with symptoms lasting for 24 hours or longer¹ (Guiu-Tula *et al.*, 2017). In critical situation it may even lead to death (Banerjee *et al.*, 2001). Stroke is a neurologic dysfunction of sudden onset, resulting from disruption of function of the cerebrovascular system (Sylaja *et al.*, 2018). A stroke occurs due to rupture or blockage in the blood vessels of the brain (Renjen, 2015), preventing the blood and oxygen reaching the brain's tissues leading to the death of the brain cells within minutes with-

out oxygen (Adler *et al.*, 2008; Jijimol *et al.*, 2013). Acute neurologic symptoms are a medical emergency which demands immediate transportation to the casualty of an acute-care hospital for evaluation and treatment. Proprioceptive neuromuscular facilitation is a technique used to stimulate the neuromuscular system which excites the proprioceptors to induce a movement which has a greater impact on selective trunk control over the pelvis (Hosseinifar, 2016).

Aim/ Objectives

Aim of study is to assess the effects of proprioceptive neuromuscular facilitation of trunk in improving trunk balance of patients with stroke.

Research Design and Methodology

An experimental study design was conducted with 20 stroke patients who falls within the age group of 60 to 70 years, who fulfilled the inclusion criteria.

Inclusion Criteria

1. Patients within the range of 60-70 years of age.
2. Mini-mental status examination score >24.
3. Both the genders can participate
4. Stroke duration of at least 6 months
5. Voluntary movement control to perform the task.
6. Medically stable patients.

Exclusion Criteria

1. Recurrent stroke
2. Severe spasticity
3. Perceptual disorders and Uncorrected vision problems.
4. Symptomatic cardiac failure.
5. Patients with other neurological disorders\ musculo-skeletal problems.
6. Impaired cognitive function
7. Patients who are unwilling to participate

Procedure

In this experimental study, 20 stroke patients who signed the written informed consent were enrolled in this study. All the subjects were screened for selection criteria. The subjects who fulfilled the eligibility criteria can be included for the study. The

trunk balance of the patients was initially assessed by means of trunk impairment scale (Dickstein *et al.*, 2000). Patients were treated with proprioceptive neuromuscular facilitation of trunk training which includes task-specific activities. The duration of the treatment is 30 minutes per day It is continued for 3 days per week. Total duration of treatment is for 4 weeks. After 4 weeks of treatment the patients were again assessed for functional outcome of the trunk by trunk impairment scale (Hsieh *et al.*, 2002). The proprioceptive neuromuscular facilitation of trunk consists of 10 minutes of each of the techniques. They are the rhythmic initiation technique, slow reversal technique, and technique of reversal of agonists. The techniques were applied to the pelvic region to improve the movements of the pelvis (Michaelsen, 2001).

Outcome Measures

Trunk Impairment Scale (TIS)

The Impairment scale for trunk is a 4-point ordinal scale (Karatas *et al.*, 2004). It is a tool which is used to assess the balance of stroke patients (Verheyden *et al.*, 2004). It is used to assess the trunk control and the trunk co-ordination (Rose *et al.*, 2017; Hsieh *et al.*, 2002).

PNF Techniques

Rhythmic Initiation

It is a progression of

- 1) initial passive movement
- 2) active-assistive movement and
- 3) active movement through the agonist pattern.

Rhythmic Stabilization

It is an isometric contraction of the agonist followed by an isometric contraction of the antagonist (Hosseinifar, 2016).

Repeated Contraction

It is an isotonic contraction against maximal resistance both concentrically and eccentrically throughout the range of motion (Guiu-Tula *et al.*, 2017).

Slow Reversal

It is an isotonic contraction of the agonist which is followed immediately by an isotonic contraction of the antagonist (Hosseinifar, 2016).

Slow Reversal-Hold

It is an isotonic contraction of the agonist followed immediately by an isometric contraction (Guiu-Tula *et al.*, 2017).

Each of the PNF techniques were repeated for 10 minutes.

Data Analysis

Descriptive Statistics

- Mean & Standard deviation for variables

Inferential Statistics

- Intra Group Analysis

Paired Sample t-test Hypothesis

Null Hypothesis

There is no significant difference of the PNF in Trunk Control in Stroke patients.

Alternate Hypothesis

There is significant difference of the PNF in Trunk Control in Stroke patients.

Level of significance, $\alpha = 0.05$

Table 1: Descriptive Statistics of Pre & Post test

	Pre Test Score	Post Test Score
Mean score	13.15	17.6
SD	1.681517	1.827567
Sample Variance	2.976316	3.515789
Median	13	17.5
Mode	13	17
Maximum	17	22
Minimum	11	14
Range	6	8
Count	20	20

Table 1 shows the descriptive statistics of pre and post test scores of effects of proprioceptive neuromuscular facilitation of trunk in terms of mean score, standard deviation, sample variance, median, mode, range, etc. The table reveals that the post test scores have been comparatively increased which indicates that there is improvement in the treatment of PNF of trunk in improving trunk balance.

Inferential Statistics

Intra-Group Analysis

Testing the effect of PNF in increasing the value of TIS

H0: There is no significant difference of the PNF in increasing the value of TIS.

H1: There is significant difference of the PNF in increasing the value of TIS.

Table 2: Comparison of Pre & Post test mean by PNF Treatment in terms of TIS Score

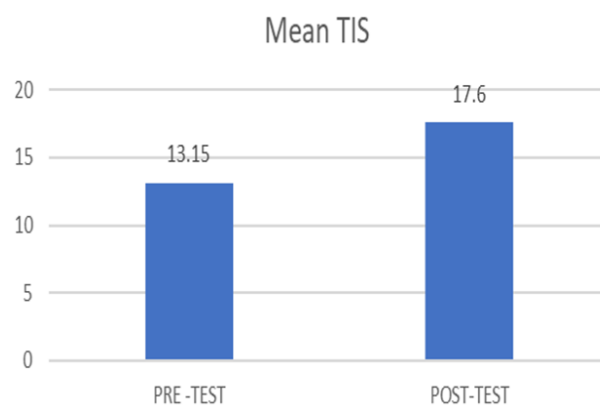
	Pre	Post
Mean score	13.15	17.6
Variance	2.98	3.52
Observation	20	20
Pearson Correlation	0.82	
Hypothesized Mean Difference	0	
degrees of freedom	19	
t Stat	18.11	
P- one-tail	0.00	
t -one-tail	1.73	
P-two-tail	0.00	
t -two-tail	2.09	

Test Statistic: t = 18.11; P-value = 0.000 < 0.05

Table 2 shows the comparison of pre and post test scores of effects of proprioceptive neuromuscular facilitation of trunk in terms of statistical analysis which includes mean score, pearson correlation, p and t test values, etc. The table reveals that the post test scores have been comparatively increased which indicates the prognosis in the treatment of PNF of trunk in improving trunk balance.

RESULTS AND DISCUSSION

As per the result of Intra-Group Analysis (i.e., within group), it is concluded that PNF is effective in terms of TIS in improving trunk control.



Graph 1: Comparison of Pre & Post-test mean by PNF Treatment in terms of TIS

Graph 1 shows the graphical representation of the comparison of pre and post test scores of effects of proprioceptive neuromuscular facilitation of trunk in terms of trunk impairment score. The table reveals that the post test scores have been comparatively increased which indicates the prognosis in the

treatment of PNF of trunk in improving trunk balance.

The p-value of the test is less than 0.05. In addition, the mean value of TIS is increased from Pre-test (13.15) to Post-test (17.6). Hence, it is concluded that there is significant effect of the PNF in increasing the value of TIS from Pre-test to Post-test after 4 weeks of treatment. A research study by Dilip khalal et al, (2013), supports this present hypothesis of effect of trunk proprioceptive neuromuscular facilitation technique on trunk movement based on the measurement of trunk impairment scale.

CONCLUSIONS

The result showed that proprioceptive neuromuscular facilitation of trunk is more effective in improving trunk balance of patients with stroke.

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Conflict of Interest

The authors declare that they have no conflict of interest for this study.

REFERENCES

- Adler, S. S., Beckers, D., Buck, M. 2008. PNF in practice, an illustrated guide.
- Banerjee, T. K., Mukherjee, C. S., Sarkhel, A. 2001. Stroke in the Urban Population of Calcutta – An Epidemiological Study. *Neuroepidemiology*, 20(3):201–207.
- Dickstein, R., Sheffi, S., Haim, Z. B., Shabtai, E., Markovici, E. 2000. Activation of Flexor and Extensor Trunk Muscles in Hemiparesis. *American Journal of Physical Medicine and Rehabilitation*, 79(3):228–234.
- Guiu-Tula, F. X., Cabanas-Valdés, R., Sitjà-Rabert, M., Urrútia, G., Gómara-Toldrà, N. 2017. The Efficacy of the proprioceptive neuromuscular facilitation (PNF) approach in stroke rehabilitation to improve basic activities of daily living and quality of life: a systematic review and meta-analysis protocol. *BMJ Open*, 7(12):e016739.
- Hosseinifar, M. 2016. The Effects of Proprioceptive Neuromuscular Facilitation Exercises on Pain, Function, Lumbar Mobility, and Lumbar Lordosis in Patients with Non-Specific Chronic Low Back pain. *J. Pharm. Res. Allied Sci*, 5(4):250–261.
- Hsieh, C.-L., Sheu, C.-F., Hsueh, I.-P., Wang, C.-H. 2002. Trunk Control as an Early Predictor of Comprehensive Activities of Daily Living Function in Stroke Patients. *Stroke*, 33(11):2626–2630.
- Jijimol, G., Fayaz, R. K., Vijesh, P. V. 2013. Correlation of trunk impairment with balance in patients with chronic stroke. *NeuroRehabilitation*, 32(2):323–325.
- Karatas, M., Çetin, N., Bayramoglu, M., Dilek, A. 2004. Trunk Muscle Strength in Relation to Balance and Functional Disability in Unihemispheric Stroke Patients. *American Journal of Physical Medicine and Rehabilitation*, 83(2):81–87.
- Michaelsen 2001. Effect of Trunk Restraint on the Recovery of Reaching Movements in Hemiparetic Patients. *Stroke*, 32(8):1875–1883.
- Renjen 2015. Epidemiological study of Incidence and risk factors of ischemic stroke Epidemiological study of incidence and risk factors of Ischemic stroke subtypes according to Trial of ORG 10172 in acute stroke treatment criteria. *International Journal of Medicine and Public Health*, 1:50–54.
- Rose, D. K., Nadeau, S. E., Wu, S. S., Tilson, J. K., Dobkin, B. H., Pei, Q., Duncan, P. W. 2017. Locomotor Training and Strength and Balance Exercises for Walking Recovery After Stroke: Response to Number of Training Sessions. *Physical Therapy*, 97(11):1066–1074.
- Sylaja, P. N., Pandian, J. D., Kaul, S., Srivastava, M. P., Khurana, D., Schwamm, L. H., Kesav, P., Arora, D., Pannu, A., Thankachan, T. K., Singhal, A. B. 2018. Ischemic Stroke Profile, Risk Factors, and Outcomes in India. *Stroke*, 49(1):219–222.
- Verheyden, G., Nieuwboer, A., Mertin, J., Preger, R., Kiekens, C., Weerdt, W. D. 2004. The Trunk Impairment Scale: a new tool to measure motor impairment of the trunk after stroke. *Clinical Rehabilitation*, 18(3):326–334.