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RESEARCH ARTICLE

Association Between Hydronephrosis Severity and Renal Function in Patients with Ureteric Obstruction

Moushumi Debnath[1] *, Aditi Surpur [2], Sudharani Kishore Bethu [3], Sushovan Mandal [4], Akshaya Narayan Iyer [5], . Neha [6], . Mohan Nallathambi [7], Amit Kumar [8]

[1] Professor, Dr NY Tasgaonkar College of Physiotherapy, Karjat, Mumbai
[2] MPT 2nd year , Neurology , Post Graduate Student, Swami Rama Himalayan University, Dehradun. 248016
[3] HOD for physiotherapy Department, Metas Adventist Hospital Athwalines Surat (Gujarat)-395001
[4] Clinical Physiotherapist, Egra Super Speciality hospital, west bengal, 721429
[5] Assistant Professor, B R Harne College, 421503
[6] Assistant Professor,MSVS College of Physiotherapy 416812
[7] Senior Specialist Physical Therapist, Mind Optimization & Health Advancement Network, 139 Voc Street , Thirukuralar Nagar, Arumbarthapuram, Pondicherry, 605010
[8] Assistant Professor, Maharishi Markandeshwar Institute of Physiotherapy and Rehabilitation, Maharishi Markandeshwar (Deemed to be) University, Mullana- Ambala, 133207`

*Corresponding Author

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Abstract: ***Background***: Hemiparesis following stroke leads to impaired trunk control, postural instability, and reduced functional performance. Trunk impairment contributes significantly to balance dysfunction, gait abnormalities, and decreased independence in activities of daily living (ADLs). Proprioceptive Neuromuscular Facilitation (PNF) techniques and Task-Oriented Training (TOT) are widely used physiotherapeutic strategies aimed at enhancing trunk stability and functional outcomes in stroke rehabilitation. ***Aim*** To compare the effects of Proprioceptive Neuromuscular Facilitation (PNF) versus Task-Oriented Training on trunk control and functional performance in hemiparetic patients. ***Methods*** A randomized controlled trial was conducted on 30 post-stroke hemiparetic individuals. Participants were randomly assigned into two groups: Group A (PNF) and Group B (TOT). Both groups received 45-minute sessions, 5 days/week for 4 weeks. Outcome measures included Trunk Impairment Scale (TIS) and modified barthel index. Pre- and post-intervention scores were analyzed using Wilcoxon matched pairs signed rank test and Mann Whitney Test. ***Results*** Both interventions led to significant improvements within groups ($p < 0.05$). However, Group A (PNF) showed significantly greater improvements in TIS and MBI scores compared to Group B (TOT) ($p < 0.01$). ***Conclusion*** PNF is more effective than Task-Oriented Training in improving trunk control and functional balance in hemiparetic patients. Incorporating PNF into early rehabilitation may enhance postural stability and functional independence.

Keywords: Hydronephrosis, Renal Function, Ureteric Obstruction.

INTRODUCTION

Stroke is a leading cause of adult disability worldwide and frequently results in hemiparesis, impaired postural control, and functional limitations. According to the World Health Organization, stroke is defined as the acute onset of neurological dysfunction due to disturbances in cerebral circulation, with symptoms lasting more than 24 hours. In India, the prevalence of stroke ranges from 84–262 per 100,000 in rural areas and 334–424 per 100,000 in urban areas, with an estimated one million cases annually. Stroke accounts for 5.5 million deaths worldwide and contributes significantly to disability-adjusted life years (DALYs), particularly in low- and middle-income countries.

The motor consequences of stroke vary according to lesion size and location, but hemiparesis is among the most common impairments. Trunk muscles, unlike limb muscles, receive bilateral innervation; therefore, trunk impairment occurs on both sides of the body, leading to difficulties in maintaining posture and performing functional tasks. Reduced trunk control negatively affects sitting and standing balance, gait, upper-limb function, and independence in activities of daily living (ADLs). Research indicates that trunk performance remains significantly impaired across acute, subacute, and chronic phases of recovery.

Effective trunk control requires coordinated activation of abdominal and posterior trunk muscles to oppose gravity, prevent unwanted movement, and control movement speed. Post-stroke individuals commonly exhibit weak anticipatory postural adjustments, reduced selective trunk movements, and difficulty dissociating upper and lower trunk components. As a result, restoring trunk stability is essential for improving limb function, mobility, and overall rehabilitation outcomes.
Proprioceptive Neuromuscular Facilitation (PNF) is widely used to enhance neuromuscular activation through diagonal patterns, proprioceptive input, and facilitation techniques. PNF trunk and pelvic patterns have shown positive effects on improving stability, coordinated trunk motion, and functional performance in stroke patients. Conversely, Task-Oriented Training (TOT) emphasizes functional, goal-directed, and repetitive activity practice that promotes motor learning, cortical reorganization, and better performance of daily tasks.

Although both PNF and TOT are used clinically, evidence comparing their relative effectiveness on trunk control in hemiparetic patients is limited. As trunk impairment is a critical determinant of post-stroke functional independence, it is important to identify which therapeutic approach yields superior benefits. Therefore, this study aims to compare the effects of PNF and Task-Oriented Training on trunk control and functional performance in hemiparetic individuals.

MATERIAL AND METHODS

Study Design: Comparative study
Study place: Civil Hospital and Private Hospital of Junagadh
Sample Size: 30 participants
Sampling criteria:

Inclusion criteria:

- Age between 35 to 65 years
- Mini mental examination score 24 or more than 24
- Subjects able to sit
- Voluntary Control grading 2 or more than 2

Exclusion criteria:

- Medically Unstable subjects
- Musculoskeletal problems which affect the treatment program
- Previous history of stroke more than one time

Randomization: Simple random sampling

INTERVENTION:
Group A – PNF Training (n = 15)
Group B – Task-Oriented Training (n = 15)
Duration: 6 days per week
Exercise program in, PNF group Receive PNF chopping and Lifting patterns for Trunk for 15 minutes, 6 to 12 repetition for each in supine and in sitting and 1minute of rest period.3

Task oriented training group receive 15 minutes of Task oriented training, exercise like sit to stand with support, Picking up objects from the floor, stand up and walk four steps forward and bilateral stool touch (Trunk Rotation) and sit down.1 Each tasks practiced for 5 minutes and 1 minute of rest period was given.

Figure 1: Subject of performing PNF in supine position

Figure 2: Subject of performing PNF in sitting position

Figure 3: Subject performing Task oriented training, sit to stand with support

Figure 4: Subject performing Task oriented training, picking up object from the floor

OUTCOME MEASURES

1. **Trunk Impairment Scale (TIS)**

2. Modified barthel index (MBI)

RESULTS AND ANALYSIS

Data were analyzed using SPSS software. Wilcoxon matched pairs signed rank test compared pre and post-intervention values for TIS and MBI. A *p*-value of <0.0001 was considered statistically significant.

Table: Within group analysis TIS in Both the groups

Outcome Measure	Mean ± SD (Pre)	Mean ± SD (Post)	p-value
Group A	13.13± 2.10	20.20 ± 1.42	<0.0001
Group B	12.93±1.66	17.67 ± 2.61	<0.0001

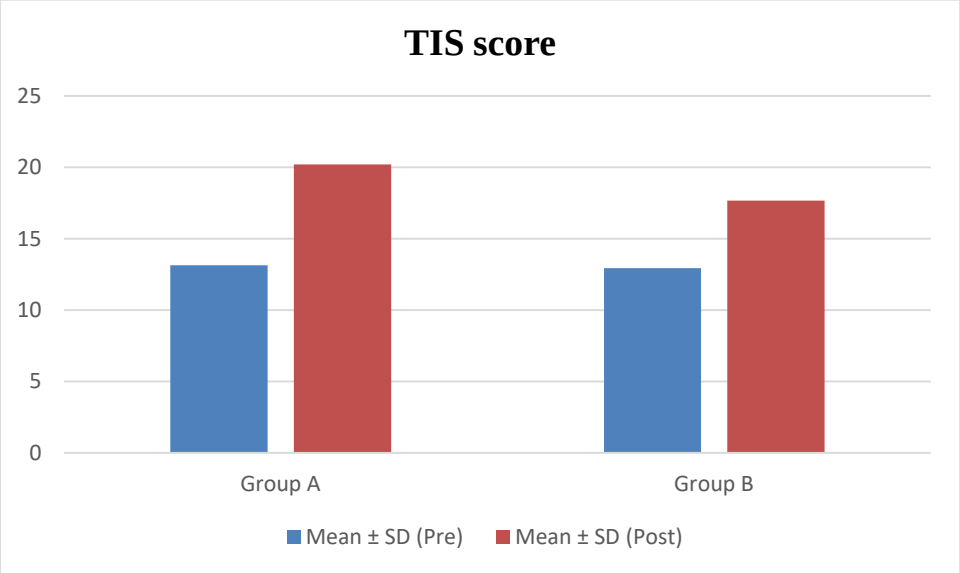


Fig. Graph showing pre and post intervention scores of TIS

Table: Within Group analysis MBI in both the groups

Outcome Measure	Mean ± SD (Pre)	Mean ± SD (Post)	p-value
Group A	75.53 ± 3.99	84.80±3.62	<0.0001
Group B	73.73±6.53	78.47±6.78	<0.0001

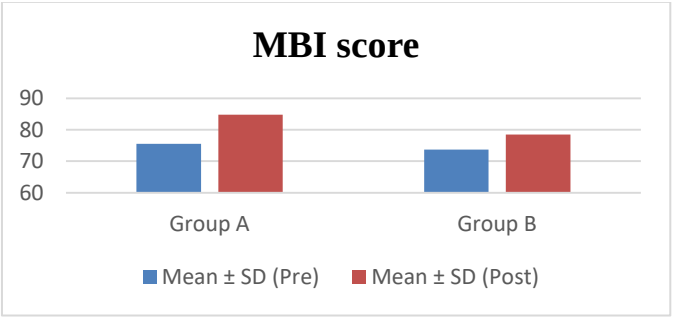


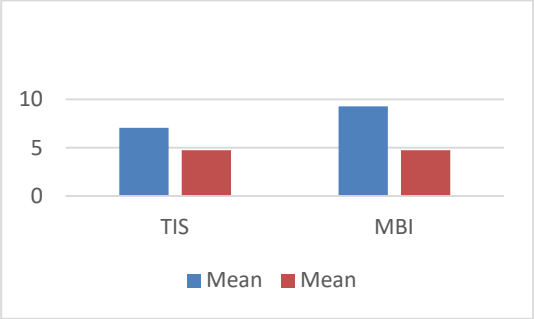
Fig. Graph showing pre and post intervention scores of MB

Comparison between Groups:

Comparison of mean difference between the PNF and Task oriented training group was done by Mann Whitney Test, at the P-values accepted at the 0.05% level of significant. The result shows that the PNF group and Task oriented training group both are improving at the p-value 0.0055 and 0.0035 level of significance but the PNF group is improving more than the Task oriented training group statistically.

Table 4: Comparison of Mean Difference between groups

Outcome Variables	Mean Difference 1	Mean Difference 2	P Value
TIS	7.06±1.53	4.73±2.60	0.0055
MBI	9.26±4.25	4.73±2.34	0.0035



DISCUSSION

The aim of the study was to improve trunk control by using PNF and Task Oriented Training. The study gives the information in the favour of PNF in hemiparetic patients.

Here there has been used PNF and Task Oriented Training to improve the trunk control in hemiparetic patients. PNF group receive the PNF chopping and lifting patterns and Task Oriented Training Receive the Task Oriented Training like sit to stand with support, picking up objects from the floor, stand up walk four steps forward and bilateral stool touch, for the 6 weeks and TIS and MBI was taken pre and post intervention. Both the group showed significant improvement but the PNF group show more improvement then the Task oriented training group significantly.

The within the group imporvement was significant pre and post treatment. Between the group comparisons shows improve PNF more than the Task oriented group significantly.

Younghun Kim et al, 2011, concluded, the trunk stabilizing exercise using PNF perfromed by stroke patients were effective at improving FRT and muscles activity of the soleus and quadriceps. [14l

PNF technique led to improvement in the functional ambulation of post-stroke individuals. PNF is recommended as an effective treatment for functional ambulatory gains in stroke rehabilitation (Akosile et al, 2011). In this study the PNF group is improving on TIS and function than the Task oriented training group.

Post-intervention, both the groups shows improvement on trunk performance, range of motion, balance and gait but the experimental group shows more improvement than control group changes in mean score between group comparison for TIS (Dilip Khanal et al, 2013).

Task oriented training group showed the significant improvement on TIS and MBI. The results demonstrate that a functional application of task targets may favorably modulate both reaching and posture performance and exert various positive effects on postural control. Such applications may have a place in the therapeutic recovery efforts for patients affected with stroke (Hsiesh-ching chen et al, In this study total number of subjects were 30 and 15 in each group, in which female subjects were 13 and male subjects were 17. Both the group received exercise protcol for the 6 weeks and result suggest that both the groups were improving significantly but the PNF was more than the Task oriented significantly.

Use of task-oriented circuit class training to improve gait and gait-related activities in patients with chronic stroke (Lotte Wevers et al, 2009). Patients learn by activatively attempting to solve the problems inherent in a functional functional task rather than repetitively practicing normal patterns of movement (Shumway-cook, 2nd edition).

The mechanism of Proprioceptive Neuromuscular Facilitation is by facilitating the neuromuscular mechanism. By stimulating the proprioceptors. Kabat reported that a greater motor response can be attained when employing facilitating techniques in addition to resistance. Facilitation resulted from a number of factors such as application of stretch, use of particular movement patterns and use of maximal resistance in order to induce irradiation. All these facilitatory techniques might help to facilitate trunk motion and stability (Dilip Khanal, 2013).

The brain recognizes only gross joint movement and not individual muscle action. Moreover, the strength of a muscle contraction is directly proportional to the activated motor units. Therefore, to strengthen a muscle, the maximum number of motor units should be stimulated. This can be obtained by maximum resistance, which is called the "irradiation or overflow principle". Maximal resistance causes recruitment with irradiation or spread of excessive impulses from stronger muscle group to weaker one, within the same pattern or from stronger patterns to weaker ones. (Dr. Enas Elsayed).

This Response can be seen as increased facilitation (contraction) or inhibition (relaxation) in the synergistic muscle and patterns of movement. Stronger pattern can also be used to reinforce weaker pattern through mechanism of irradiation from one extremity to other or extremity to trunk.

In the Task Oriented approach it is assumed that normal movement emerges as an interaction among many systems, each contributing its own aspects of control. In addition movement is organized around a behavioral goal and is constrained by the environment (shumway cook, 2nd edition).

However the study shows the improvement of the Proprioceptive Neuromuscular Facilitation then the Task oriented training in Hemiparetic patients clinically and statistically.

CONCLUSION

The study aimed to improve trunk control by using PNF and Task oriented trainig in hemiparetic individuals.
The study concluded that clinically and statistically the PNF group and Task oriented group both are improving trunk control and functional activities but the PNF group is improving more than the Task oriented group significantly.

CONFLICT OF INTEREST:
None
FUNDING:
None

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