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**EFFECTIVENESS OF KINESIO TAPPING ALONG WITH PNF TECHNIQUE  
TO REDUCE A PAIN AND IMPROVE STABILITY IN PATIENTS WITH  
SHOULDER SUBLUXATION IN STROKE**

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**ABSTRACT**

**Aim:** This study finds the effectiveness of kinesio tapping along with PNF technique to reduce a pain and improve stability in patients with shoulder subluxation in stroke.

**Background:** In recent years, Stroke is a leading cause of long-term disability worldwide, resulting in significant motor impairments and functional limitations. One common complication following a stroke is shoulder subluxation, which occurs due to muscle weakness and loss of proprioception around the shoulder joint. Recent studies suggest that PNF and kinesio taping helps to reduce pain and improve stability in shoulder subluxation after stroke.

**Objective:** This study examined the effectiveness of using PNF and kinesio taping showed significant improvement in patients with stroke.

**Methods:** 50 subjects were selected per criteria: Group A (25) – experimental, received kinesio taping + PNF; Group B (25) – control, received PNF only. Pain (VAS) and function (WOSI) measured pre- and post-intervention. Treatment: 40 min/day, 3 days/week, for 24 weeks.

**Results:** 50 trials were analyzed. Compared with the control group conventional therapy, the intervention group kinesio tapping along with PNF technique shows significant improvements in upper extremity pain and stability measured by the VAS scale and WOSI.

**Conclusions:** The combination of Kinesio Taping and PNF techniques proved to be an effective therapeutic approach for managing shoulder subluxation in stroke patients. It not only decreased pain intensity but also enhanced joint stability and functional outcomes, thereby improving overall upper limb function. Incorporating these techniques into stroke rehabilitation programs can accelerate recovery and improve the quality of life for patients.

**Keywords: Kinesio Taping, PNF techniques, Pain, Stability**

## INTRODUCTION

Stroke is one of the leading causes of adult disability worldwide, often resulting in long-term motor impairments and functional limitations. Among its many complications, hemiplegic shoulder subluxation (HSS) is a common musculoskeletal problem that occurs in nearly 17–81% of post-stroke patients, particularly during the flaccid stage of paralysis [1-2]. Shoulder subluxation is defined as a partial dislocation of the humeral head from the glenoid cavity, primarily due to muscle weakness, altered tone, poor motor control, impaired proprioception, and the effects of gravity on the paralyzed limb led to instability around the shoulder joint. Weakness of rotator cuff and scapular stabilizers & spasticity of other muscles causes inferior subluxation of the humeral head. This results in pain, reduced range of motion, and poor functional use of the upper limb.

This condition often leads to severe shoulder pain, reduced upper limb function, impaired balance, and decreased quality of life, thereby hindering effective participation in rehabilitation programs. Shoulder pain is also closely associated with reduced activities of daily living (ADL) performance and poorer overall stroke recovery outcomes.

Over the years, several rehabilitation strategies have been used to address shoulder subluxation in stroke, such as electrical stimulation, slings, positioning techniques, therapeutic exercises, and taping methods. Among them, Kinesio Taping (KT) and Proprioceptive Neuromuscular Facilitation (PNF) techniques have gained popularity.

### **Kinesio Taping**

**Mechanical correction:** Kinesio Taping provides external support to approximate the humeral head into the glenoid cavity, reducing subluxation [3-4].

**Proprioceptive input:** Stimulates cutaneous mechanoreceptors → enhances joint position sense and neuromuscular control.

**Pain modulation:** Via gate control mechanism and reduced abnormal stress on soft tissues, Kinesio Taping decreases shoulder pain.

**Facilitates muscle activity:** Properly applied Kinesio Taping can facilitate weak muscles (like supraspinatus, deltoid) and inhibit overactive/spastic muscles.

#### **PNF techniques**

**Neuromuscular re-education:** Uses diagonal and spiral movement patterns, which are closer to functional movements.

**Improves motor recruitment:** Enhances activation of weak shoulder stabilizers and scapular muscles [5].

**Facilitates proprioception:** Increases sensory feedback, helping the patient regain joint control and coordination.

**Strengthening and stability:** Techniques like rhythmic stabilization, slow reversal, and hold-relax promote dynamic stability and range of motion.

#### **Combination therapy**

Kinesio Taping provides constant external correction and proprioceptive cueing, even outside therapy sessions.

PNF provides active neuromuscular training and strengthening during therapy.

#### **Together:**

Kinesio Taping → maintains joint alignment & reduces pain.

PNF → retrains muscle activation & motor patterns.

This synergistic effect improves shoulder stability, reduces pain, and enhances functional recovery better than either alone.

Evidence from Studies Kinesio Taping alone is effective in reducing pain and partially correcting subluxation, but its effect is temporary without active retraining. PNF alone improves motor control and stability, but pain and alignment issues may hinder progress [6 -9]. Combined use ensures both structural support (Kinesio Taping) and functional re-education (PNF), leading to better outcomes in pain, stability, and functional use of the arm. Although both techniques have shown individual benefits, there is growing interest in combining Kinesio Taping with PNF to maximize pain relief and stability improvement in stroke patients with shoulder subluxation. This combined approach may offer mechanical support, sensory feedback, and neuromuscular activation simultaneously, thus improving functional outcomes and facilitating faster recovery.

#### **Need for the Study**

Conventional therapies often provide only partial relief, highlighting the need for

more effective approaches. Proprioceptive Neuromuscular Facilitation (PNF) enhances joint stability and motor control, while Kinesio Taping (KT) offers pain reduction and proprioceptive feedback. Evidence on their combined use is adequate, and exploring their synergistic effect may provide a more effective strategy to reduce pain, improve shoulder stability, and enhance functional outcomes in stroke rehabilitation.

## METHODOLOGY

### Study Design

This study was conducted by using A randomized controlled trial (RCT) will be conducted to evaluate the effectiveness of **Kinesio Taping (KT) along with Proprioceptive Neuromuscular Facilitation (PNF) techniques** in reducing pain and improving shoulder stability in post-stroke patients with shoulder subluxation.

### Study Setting

The study will be carried out in Aarogya physiotherapy and Rehabilitation Centre, Erode, Tamil Nadu.

### Sample Size

A total of 50 stroke patients with shoulder subluxation will be selected according to the inclusion and exclusion criteria.

### Sampling Method

Participants will be randomly allocated into two groups using a simple random sampling method:

- **Group A (Experimental group, n=25):** KT + PNF techniques
- **Group B (Control group, n=25):** PNF techniques only

### Inclusion Criteria

- Patients diagnosed with first-time ischemic or hemorrhagic stroke.
- Age group: 40–70 years.
- Presence of shoulder subluxation (clinical or radiological confirmation).
- Post-stroke duration: 1–6 months.
- Ability to follow verbal commands.

### Exclusion Criteria

- Recurrent stroke or other neurological disorders.
- Severe cognitive or communication impairment.
- History of shoulder fracture, dislocation, or orthopedic surgery.
- Skin allergies or contraindications for taping.

### Intervention

- **Group A (KT + PNF):**
  - Kinesio Taping will be applied around the shoulder joint to provide mechanical correction, proprioceptive input, and pain reduction. PNF patterns (such

as D1 flexion/extension and scapular patterns, D1 Flexion helps activate supraspinatus and anterior deltoid for shoulder stability, while scapular anterior elevation improves upward gliding → reducing subluxation.) will be administered to improve shoulder stability, neuromuscular control, and functional movement.

- **Group B (PNF only):**
  - Participants will receive the same PNF techniques like Rhythmical stabilisation facilitates co-contraction of agonist and antagonist muscles around the glenohumeral joint, improving joint approximation, stability, and proprioception. without taping.

Both groups will undergo intervention 5 sessions per week for 4 weeks.

### Outcome Measures

- **Pain:** Measured using Visual Analog Scale (VAS) [10].

- **Shoulder Subluxation:** Measured clinically (finger breadth method) and/or radiographically.
- **Stability & Function:** Assessed using **WOSI (Western Ontario Shoulder Instability) Index** is a disease-specific patient-reported outcome measure developed to evaluate functional ability, symptoms, and quality of life in individuals with shoulder instability. [11]

### Treatment Technique

- The selected patients received clear explanation about the treatment procedure prior to the study.
- The written informed consent form was received before the intervention began.
- The participants received interventions with a target of 5 sessions per week for 4 weeks.
- The pre and post test values were taken by using VAS and WOSI
- Designated research therapists provided both the Kinesio Taping and PNF techniques.



Figure 1.1: Conventional Group (B) receives PNF techniques alone



Figure 1.2: Experimental Group (A) with application of Kinesio Taping and PNF techniques

### Data Analysis

**Table 1.1** shows the post-test WOSI scores of both Group A and Group B were analyzed using an independent *t*-test. The obtained *t*-value was 3.10, which is greater than the critical value at the 0.05 significance level, indicating Group A showed significantly greater improvement in WOSI scores compared to Group B, suggesting that the intervention applied to Group A was more effective in enhancing shoulder function.

**Graph 1.1** shows The post-test analysis of the WOSI scores between Group A and Group B. Data showed that Group A demonstrated significantly greater improvement. This indicates that the intervention applied to Group A was more effective in reducing

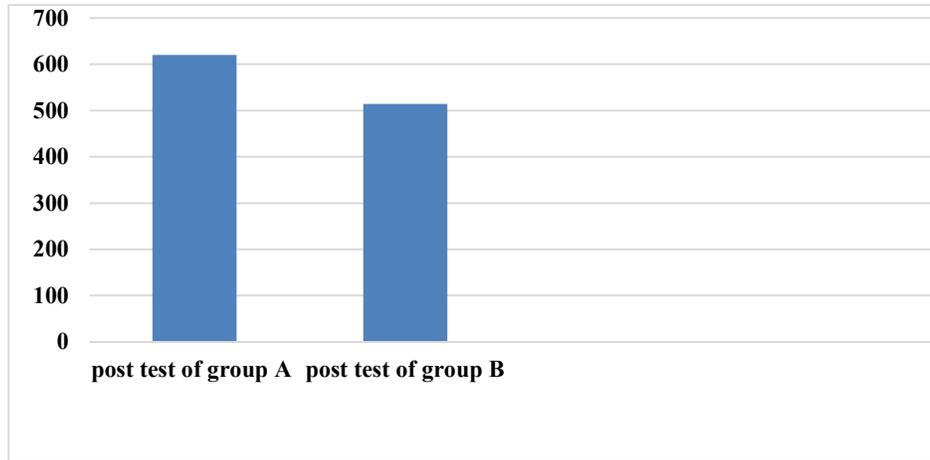
symptoms and improving shoulder function compared to Group B.

**Table 1.2** shows the post-test values of the VAS scale for both Group A and Group B were analyzed using an independent “*t*” test. The calculated “*t*” value was 4, which is greater than the critical value at the 0.05 significance level. Therefore, there is a statistically significant improvement in the VAS scores after the application of the respective exercises in Group A than Group B.

**Graph 1.2** shows the post-test analysis of the VAS Scale between Group A and Group B. Data showed that Group A demonstrated significantly greater improvement. This indicates that the intervention applied to Group A was more effective in reducing symptoms and improving shoulder function compared to Group B.

Table 1.1: Group Analysis Between The Group A And Group B (WOSI Scale)

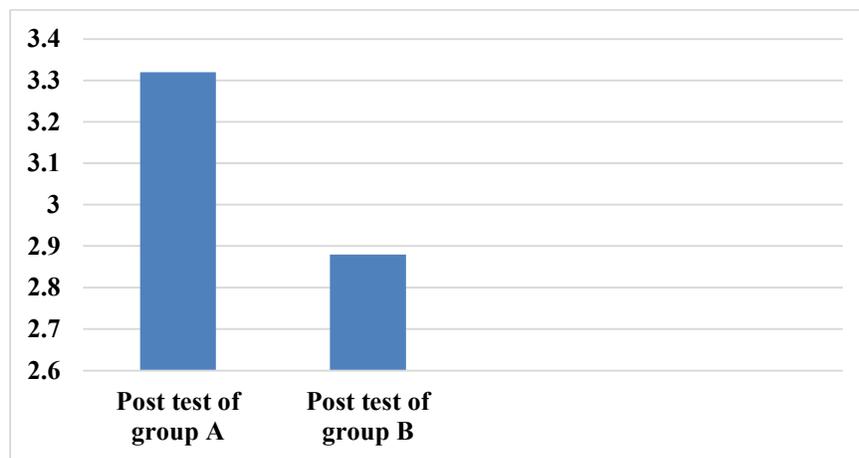
COMPONENT	TEST	MEAN	SD	T VALUE	P VALUE
WOSI INDEX	POST GROUP A	620	83.470	3.10	<0.05
	POST GROUP B	514	148.7		



Graph 1.1

Table 1.2: Group Analysis Between The Group A And Group B (VAS Scale):

COMPONENT	TEST	MEAN	SD	T VALUE	P VALUE
VAS SCALE	POST GROUP A	3.32	0.74	4	<0.05
	POST GROUP B	2.88	1.40		



Graph 1.2

**LIMITATIONS**

Despite promising results, some limitations should be acknowledged:

- Small sample size may limit generalizability.
- Short duration of intervention and follow-up; long-term benefits remain unclear.
- Lack of sham-taping group makes it difficult to fully rule out placebo effect of KT.

- Variability in stroke severity and chronicity among participants could influence outcomes.

## DISCUSSION

The present study aimed to evaluate the effectiveness of Kinesio Taping (KT) along with Proprioceptive Neuromuscular Facilitation (PNF) techniques rhythmic stabilization in reducing pain and improving shoulder stability in stroke patients with subluxation. Rhythmic stabilization promotes co-contraction of shoulder muscles through alternating isometric resistance, plays a crucial role in enhancing dynamic joint stability along with Kinesio Taping promotes static stability of shoulder joint proprioceptive. The findings suggest that the combination of Kinesio Taping and PNF is more effective than PNF alone in enhancing shoulder joint alignment, reducing pain, and improving functional performance.

## SUMMARY AND CONCLUSION

The study demonstrated that Kinesio Taping combined with Proprioceptive Neuromuscular Facilitation (PNF) techniques is more effective than PNF alone in reducing shoulder pain and improving stability in stroke patients with shoulder subluxation. The addition of Kinesio Taping provided immediate joint support and proprioceptive feedback, which enhanced patient comfort

and allowed more effective participation in PNF-based motor retraining. This synergistic approach not only reduced subluxation and pain but also improved upper limb function and shoulder mobility.

Overall, Kinesio Taping serves as a simple, non-invasive, and cost-effective adjunct to physiotherapy interventions, making it a valuable tool in stroke rehabilitation programs.

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