



## ADDED EFFECT OF PROPRIOCEPTIVE NEUROMUSCULAR FACILITATION TECHNIQUE WITH MAITLAND MOBILISATION TECHNIQUE IN PERIARTHRITIS OF SHOULDER

**Anjali V Kulkarni\*** Assistant professor, Shree Siddheshwar college of Physiotherapy, Solapur  
\*Corresponding Author

**Ruchita Hajare** Clinical physiotherapist, Thane.

**ABSTRACT** **Background:** Periarthritis of shoulder is a chronic inflammatory disorder of shoulder and surrounding soft tissues, characterized by insidious and progressive pain & restriction of both active and passive glenohumeral joint motion in all planes. **Objective:** To assess the effect of Proprioceptive Neuromuscular Facilitation & Maitland Mobilisation in Periarthritis of shoulder. To compare the added effect of PNF with Maitland Mobilisation in Periarthritis of shoulder. **Method:** 30 Patients diagnosed with stage I & II periarthritis of shoulder were included in the study. Group A which is control group received IFT for 10 minutes, hot pack, Maitland grade 3& 4 end range mobilization for shoulder to improve external rotation, abduction, and flexion. Group B which is experimental group received same conventional treatment as group A along with PNF technique for 3 weeks. At the end of 3rd week, posttest evaluation comprising of active ROM measurements, strength by taking MMT, & SPADI was taken for both the groups. **Results:** It was found that there was significant increase in ROM and decrease in SPADI score within both the groups i. e. control and experimental. **Conclusion:** Study proved that PNF combined with conventional treatment helps to improve range of motion and function of shoulder joint in stage I & II of periarthritis of shoulder. So the technique can be incorporated with the conventional protocol for the management of above condition.

**KEYWORDS :** Proprioceptive Neuromuscular Facilitation, Maitland mobilization, periarthritis of shoulder

### INTRODUCTION

Periarthritis of shoulder is a chronic inflammatory disorder of shoulder and surrounding soft tissues. It is characterized by insidious and progressive pain & restriction of both active and passive glenohumeral joint motion in all planes. Periarthritis of shoulder has 3 stages, Stage I: Freezing stage where patient has more and more pain. As pain worsens there is restriction of range of motion. Stage II: Frozen stage where pain begins to diminish and shoulder becomes stiffer. Stage III: Thawing stage where Shoulder range of motion improves (Recovery). In stages I and II of periarthritis of shoulder, range of motion is significantly restricted. Restriction of movement is in the capsular pattern i.e. external rotation is most limited, followed by limitation in abduction and internal rotation respectively.

**Maitland mobilization:** This is a graded oscillatory technique comprising of 5 different grades. Grade I: Small amplitude rhythmic oscillation at the beginning of available range. Grade II: Large amplitude rhythmic oscillation within the available range of motion. Grade III: Large amplitude rhythmic oscillation reaching up to the tissue resistance. Grade IV: Small amplitude rhythmic oscillation reaching up to the tissue resistance. Grade I and Grade II mobilization are used to decrease pain while Grade III and IV are utilized to improve ROM.

**Proprioceptive Neuromuscular Facilitation:** PNF is an approach to therapeutic exercise that combines diagonal pattern of movement with techniques of neuromuscular facilitation to evoke motor responses and improve neuromuscular control and function. There are two pairs of foundational movement for the upper extremities; UE D1 flexion and extension pattern, UE D2 flexion and extension pattern.

In Periarthritis of shoulder, ROM is decreased due to capsular tightness, disuse muscular weakness and altered muscle length leading to loss of normal glenohumeral rhythm. In the treatment of periarthritis of shoulder, Maitland mobilization aims to improve the ROM.

Proprioceptive Neuromuscular Facilitation is a technique which aims to improve the neuromuscular control and function. When PNF technique is used as an adjunct to the mobilization technique, it will result in improved strength and coordination of the muscles and also normalizes the muscle length, thereby enhancing the improvement in ROM and functional ability of the affected shoulder.

There are studies showing individual effects of PNF, Maitland and Mulligan techniques in the management of periarthritis of shoulder however not many studies have evaluated the efficacy of using a PNF as an adjunct to mobilization techniques.

This study will be aimed to evaluate the efficacy of PNF as an adjunct to the Maitland technique mobilization in improving the functional

ability, strength and ROM in the treatment of periarthritis of shoulder.

### AIM OF STUDY:

To know the added effect of PNF with Maitland mobilization in improving the functional ability, strength and ROM in the treatment of periarthritis of shoulder.

### OBJECTIVE OF STUDY:

To assess the effect of Proprioceptive Neuromuscular Facilitation in Periarthritis of shoulder.  
To assess the effect of Maitland Mobilisation in Periarthritis of shoulder.  
To compare the added effect of PNF with Maitland Mobilisation in Periarthritis of shoulder.

### MATERIALS AND METHODOLOGY:

#### MATERIALS:

Pen, Paper, Plinth, Goniometer, IFT Machine, Hot Pack, Shoulder pain and disability index

#### METHODOLOGY:

Type of study: Experimental study.

Sampling: Purposive sampling.

Sample size: 30.

Outcome Measures: Shoulder ROM, Shoulder MMT, SPADI Score.

Duration of study: 3 weeks.

#### Inclusion Criteria:

Both male and female subjects.  
Subjects with pain and restriction of passive joint mobility when compared to the unaffected side and diagnosed with periarthritis of shoulder.

#### Exclusion Criteria:

History of Rheumatoid arthritis, osteoarthritis, malignancies in the shoulder region.  
Pain or disorders of cervical spine, elbow, wrist or hand.  
Trauma to the shoulder joint.

#### METHODOLOGY:

- 30 Patients diagnosed with stage I & II periarthritis of shoulder were included in the study. Informed consent was taken. Subjects who fulfil the inclusion criteria were randomly assigned into 2 groups. Pre-test evaluation was done for both the groups to measure active ROM using goniometer, strength by MMT, and functional deficit will be measured using SPADI (Shoulder Pain And Disability Index)
- Group A which is control group received IFT for 10 minutes, hot pack, Maitland grade 3& 4 end range mobilization for shoulder to improve external rotation, abduction, and flexion, 2-3 oscillations per second was given for 1 minute and 15 sets were given (5 sets for flexion, 5 sets for abduction, 5 sets for lateral rotation) with 10

seconds of rest period after every session. Mobilization was given 4 times per week for 3 weeks. Exercises which include passive movements, active assisted exercises, pendular exercises and resistive exercises, capsular stretching exercises were also given to subjects of this group.

- Group B which is experimental group received same conventional treatment as group A along with PNF technique. D2 flexion pattern with contract relax technique was given for 10-15 repetitions to improve shoulder external rotation, abduction, and flexion.
- Each group received the interventions once a day for 3 weeks (4 times/week). At the end of 3rd week, post-test evaluation comprising of active ROM measurements, strength by taking MMT, & SPADI was taken for both the groups.

**RESULTS:**

Descriptive statistics including p- value, standard deviation, mean was calculated.

Paired t- Test was used for pre and post intervention comparison within the groups and Comparison between two groups was done using Unpaired t- Test.

**Table No. 1: Shows pre and post values of the shoulder range of motion of the Experimental Group and Control Group calculated using Paired t- Test.**

		Experimental Group		Control Group	
		Pre	Post	Pre	Post
Flexion	Mean	106.5	150.2	102	136.9
	SD	32.30	24.54	27.76	26.11
	p- value	0.0009 (extremely significant)		0.0059 (very significant)	
Abduction	Mean	104.4	136.4	98.6	119.6
	SD	36.80	28.21	30.18	31.71
	p- value	0.0002 (extremely significant)		0.0045 (very significant)	
External Rotation	Mean	52.33	65.73	44.2	52.6
	SD	10.87	9.87	16.69	17.17
	p- value	0.0016 (very significant)		0.224 (significant)	

**Table No. 2: Shows pre and post values of the shoulder muscle MMT of the Experimental Group and Control Group calculated using Paired t- Test.**

		Experimental Group		Control Group	
		Pre	Post	Pre	Post
Flexion	Mean	3.86	4.3	4	4.4
	SD	0.51	0.61	0.75	0.73
	p- value	0.0155 (significant)		0.0819	
Abduction	Mean	3.8	4.4	3.9	4.2
	SD	0.67	0.63	0.59	0.56
	p- value	0.0061 (very significant)		0.1779	
External Rotation	Mean	3.8	4.3	4	4.2
	SD	0.67	0.72	0.75	0.70
	p- value	0.0023 (very significant)		0.1885	

**Table No. 3: Shows pre and post values of the SPADI Score of the Experimental Group and Control Group calculated using Paired t- Test.**

		Experimental Group		Control Group	
		Pre	Post	Pre	Post
SPADI Score	Mean	75.66	45.4	67.6	48.13
	SD	22.19	26.15	22.56	22.11
	p- value	< 0.0001 (extremely significant)		< 0.0001 (extremely significant)	

Mean increase in shoulder flexion, abduction and external rotation ROM in Experimental and Control group was calculated using unpaired t- Test.

Two-tailed P value for Shoulder Flexion ROM was 0.0246, for Shoulder Abduction ROM was 0.0430, for Shoulder External Rotation ROM was 0.0521, considered statistically significant.

Mean increase in shoulder flexors, abductors and external rotators MMT in Experimental and Control group, was calculated using unpaired t- Test.

Two-tailed P value for Shoulder Flexion MMT was 0.4343, for Shoulder Abduction MMT was 0.0741, for Shoulder External Rotation

MMT was 0.3560, considered statistically not significant.

Mean reduction in the SPADI Score in Experimental and Control group was calculated using unpaired t- Test.

Two-tailed P value for SPADI Score was 0.0045, considered statistically very significant.

**DISCUSSION**

The current study was undertaken to assess the added effect of PNF with Maitland mobilization in PA Shoulder. In this study, 30 patients with PA shoulder were selected and randomly divided into 2 groups as experimental and control group. The outcome measure was ROM, MMT, SPADI Scale.

It was found that there was significant increase in ROM and decrease in SPADI score within both the groups i. e. control and experimental.

Each patient received 12 treatment session for 3 weeks. In control group patients received conventional treatment and in experimental group patients received conventional treatment along with PNF.

Study by Hariharasudhan Ravichandran, Janakiraman Balamurugan in 2015, also showed that subjects treated with proprioceptive neuromuscular technique demonstrated significant improvement in terms of pain relief, restoration of ROM and early return to ADL. The mechanism by which proprioceptive neuromuscular technique caused improvement in shoulder ROM and function could be elongation of tissues, which could be the probable reason helping to improve ROM and function.

Also findings of the study by Mahendran P, DinkuChetia proved that PNF Technique used i.e. contract-relax, is aimed at relaxing tense muscles and restricted joints to make quick gains in range of motion with the ultimate goal being to optimize motor performance and rehabilitation.

Some studies using goniometry have confirmed that the joint ROM can be increased significantly by PNF stretching (Etnyre& Abraham, 1986; Magnusson et al., 1996; Ferber et al., 2002; Funk et al., 2003; Wallin et al., 1985). In addition, it has been shown that the ROM gain is even larger after PNF stretching.

**CONCLUSION**

Study proved that PNF combined with conventional treatment helps to improve range of motion and function of shoulder joint in stage I & II of periarthritis of shoulder. So the technique can be incorporated with the conventional protocol for the management of above condition.

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