## **Original Research Article**

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# The prevalence of mechanical low back pain among proprioceptive neuro muscular facilitation and core muscle stabilisation

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#### **ABSTRACT**

**Background:** Cervical radiculopathy is a common disorder causing pain and disability. Objective was to determine the effects of mechanical versus manual traction in manual physical therapy combined with segmental mobilization and exercise therapy it the physical therapy management of patients with cervical radiculopathy.

**Methods:** The mechanical and manual traction was applied in group A and B along with common intervention of segmental mobilization and exercise therapy in both groups for 5 weeks. The outcomes were assessed by NPRS and NDI at the baseline and after completion of 5 weeks exercise program at 3 days per week. The paired and unpaired *t* test was applied at 95% confidence interval to determine the statistical difference among two groups and data was analysed by SPSS software version-23.

**Results:** The result revealed that there was statistically both mechanical and manual traction techniques are equally significant in group A and B for pain and disability (p <0.05) and were better in the experimental group.

**Conclusions:** If patients of cervical radiculopathy treated with mechanical traction, segmental mobilization and exercise therapy will manage pain and disability more effectively than treated with manual traction, segmental mobilization and exercise therapy.

**Keywords:** Exercise therapy, Cervical radiculopathy, Traction, Segmental mobilization

#### INTRODUCTION

Pain in the lower back has been a matter of concern, affecting up to 90% of population at some time in their lives and most exclusive health problem is usually due to mechanical problems occurs between the ages of 20-50 years. From normal structural integrity of the body segment such as joint axis, muscles, and nervous structures causes mechanical irritation of pain sensitive structure. It may cause muscle atrophy and inhibit muscle firing levels leads to altered spinal mechanics which may exacerbate the pain-spasm-pain cycle that results in increased dysfunction, decreased muscle endurance, and delayed return to normal life. In order to improve low back pain there needs to be enough strength in

abdominal's trunk muscles and the pelvic floor muscles therefore strengthening exercises play an important role.<sup>3</sup> Muscles are made up of fibers that stretch and contract in order to do something. Like any components of the body, muscles have a built in safe-guard called a myotatic stretch reflex that will signal muscle to contract if it senses that it is being overstretched. There is another safeguard in tendons called Golgi tendon organ which signals the muscles to relax when your tendons are stretched too far.<sup>4</sup> Proprioceptive neuromuscular facilitation are commonly used in two forms. They are rhythmic stabilization training and combination of isotonic exercises. The rhythmic stabilization training uses isometric contraction of antagonistic patterns and results in co-contraction of the antagonist's results in

stabilization by stimulation of the agonistic pattern.<sup>5</sup> Combination of isotonic techniques involves the performance of alternating concentric, eccentric, and isometric contractions. Combination of isotonic exercises is used to evaluate and develop the ability to perform controlled purposeful movements. It involves performance of alternating concentric, eccentric and isometric contractions and is used to treat deficiencies in strength and range of motion.<sup>6</sup> Core muscle stability exercise can be defined loosely as restoration of augmentation of the ability of the neuro-muscular system to control and protect the spine from the injury. Main goal is to improve lumbo-pelvic control. Core serves as a muscle corset that works as a unit to stabilize the body and spine, with and without limb movement and hence strengthening helps to prevent and rehabilitate various lumbar spine and musculoskeletal disorders.<sup>8</sup> It has been concluded that proprioceptive neuromuscular facilitation is beneficial than core muscle stabilization exercise in low back pain patients. Comparison of their effects needs to be established to provide early and better relief from the disability. Low back pain is the common disability for people and hinders their functional ability. It is proven that Proprioceptive neuromuscular facilitation program and core stabilization exercises showed marked improvement, while treating for long duration such as 8 weeks duration. So this study was framed with shorter duration of 4 weeks. There is a need to compare both the treatment regime in order to provide better results in shorter duration of time. To study the effects of PNF training on decreasing pain, improving flexibility, and functional performance in low back pain. To study the effects of core stability exercise on decreasing pain, improving flexibility, and functional performance in low back pain. To compare the effectiveness of PNF training vs. core stability training among chronic low back pain.

#### **METHODS**

This study conducted in the department of physiotherapy Sri Venkateshwaraa Medical College Hospital and Research Centre, Puducherry. It is a comparative study conducted for a period of 6 months from 25<sup>th</sup> of October 2015 to 25<sup>th</sup> of March 2016. Thirty subject (17 female and 13 male) aged group 20 to 50(female aged group 25 to 48 and male aged group 20 to 50) years participated in this study. The patients having chronic low back pain for more than 3 months and low back pain with nonspecific manner (mechanical) were included if they had a neck pain score on the numeric pain rating scale (NPRS), Flexion, Extension of greater than 5, mild to moderate disability scores on the ODO. The study protocol was approved by the Institutional Ethics Committee (IEC) and the data was analysed using statistical package for social sciences (SPSS) version 23 as it is licensed with the SVMCH & RC. The statistical analysis of paired and unpaired t test was used to compared and analysis of outcome measures in group A and group B shows that there is statically significance changes in paired and unpaired t-test values were analysed from preintervention to post-intervention after 6 month. We used 95% CI and the results were accepted as significant if p <0.05 are shown in Table 1.

#### RESULTS

Total 30 subjects who were found suitable for the participation in the study according to their inclusion and exclusion criteria were requested to sign the consent forms and subjects were then alternatively allocated to group A and group B randomly. Pre-participation evaluation form consisted of chart with NPRS, ROM questionnaire score and Assessment chart which includes information, chief complaints, personal observational and examination findings. Group A: The participants received SWD followed by Proprioceptive Neuromuscular Facilitation technique is performed to the patients. Group B: The participants received SWD followed by Core Stabilization exercises are performed to the patients. Shortwave diathermy is the use of high frequency electromagnetic waves of frequency at 27.12 MHz and 11 m therapeutically. Physiologically, The thermal heating effects of SWD is vasodilatation, increased rate of nerve conduction, increased collagen extensibility, acceleration of enzymatic activity, changes in skeletal muscle strength, and possibly increased nociceptive threshold. Power-500 Watts, each session of 15 minutes with coplanar method of electrode placement in the lumbar region in prone position. In group A, there were 15 subjects with mean age 43.6 years, in group B there were 15 subjects with mean age 38.2 years of these 18 were male age (38.83  $\pm$  8.25 years); 12 were female with the age (42.8  $\pm$  11.13 years) and the overall age  $39.09 \pm 10.26$  years. The minimum age observed in this study has been 24 with the maximum age of 49 years. In the entire groups majority of patients has been in the age group of 31 to 40 years. The t test to find the whether Proprioceptive neuromuscular facilitation vs. core muscle stabilization exercise reduce pain and improves functional performance in subject with mechanical low back pain of the interventions used among the groups.

The statistical significant improvement in PNF is Flexion (pre 11.12±0.62, post 14.03±0.49), Extension (pre 5.62±0.57, post 9.88±0.82), NPRS (pre 15.4±1.06, post 4.9±0.57) and ODQ (pre 64.2±5.41, post 48.27±8.57) more effectively as compared with the group of patients treated with Core stability exercises is Flexion (pre  $13.23\pm0.64$ , post  $15.93\pm0.76$ ), Extension (pre  $6.24\pm0.68$ , post 8.96±0.81), NPRS (pre 15.72±1.12, post 9.92±0.91) and ODQ (pre 86.51±4.46, post 65.42±6.15) whereas statistically the results of both PNF and Core stability exercises are equally significant (p value <0.0001) in group A and B in Table 1. Above table shows that people who received PNF will have more extensor muscular flexibility than by core muscle stability training. The t value of Flexion for group A is 41 whereas for group B is 11.13, Extension for group A is 17.92 whereas for group B is 11.82, NPRS for group A is 10.49, whereas for group B is 15.31 and ODQ for group A is 6.26 whereas for group B is 3.47. The results of group A shows highly significant improvement than group B.

Table 1: Clinical and statistical comparison of flexion and extension within the group A and B.

Scale	Statistical criteria	Group A: PNF (Control group n=15)		Group B: Core stability exercises (Experimental group n = 15)	
		Pre-test	Post-test	Pre test	Post test
Flexion	Mean	11.12	14.03	13.23	15.93
	SD	0.62	0.49	0.64	0.76
	t-value	41		11.13	
	p-value	< 0.0001		< 0.0001	
Extension	Mean	5.62	9.88	6.24	8.96
	SD	0.57	0.82	0.68	0.81
	t-value	17.92		11.82	
	p-value	< 0.0001		< 0.0001	
NPRS	Mean	15.4	4.9	15.72	9.92
	SD	1.06	0.57	1.12	0.91
	t-value	10.49		15.31	
	p-value	< 0.0001		< 0.0001	
ODQ	Mean	64.2	48.27	86.51	65.42
	SD	5.41	8.57	4.46	6.15
	t-value	6.26		3.47	
	p-value	< 0.0001		< 0.0001	

NPRS- Numerical Pain Rating Scale, NDI- Neck Disability Index, SD-Standard deviation.

#### DISCUSSION

The major problem in low back pain is lumbar instability, which is common among various lumbar spine and musculo - skeletal disorders. This study was aimed to assess the effect of PNF and core muscle stabilization training among 20 - 50 years aged one with mechanical low back pain. This combined effects of PNF and core stability and found significant effect. 10 They trained their subjects with rhythmic stabilization and combination of isotonic exercises for two four weeks whereas in the present study both these interventions were combined in a single four week. Compared the effect of PNF verses core stability exercises for decreasing pain and improve function in patients with low back pain. This study concluded that the patients with low back pain are benefitted more by PNF. So PNF program should be practice.11 Conducted study on impact of three week educational program on low back pain flexibility and pain in college students. Subjects were assessed pre and post intervention using the following outcome measures Oswestry low back pain disability questionnaire, the fitness gram back saver sit and reach test, pre and post low back pain survey. The majority of the students decreased in low back pain and felt that the educational program was beneficial low back pain. The results of ODQ when analyzed with paired 't' test shows significant difference in both groups but comparing it on mean value, it was found that group A showed better results than group B which signifies the effectiveness of PNF exercises for the functional performance. 12 The results of NPRS when analyzed with paired 't' test shows significant difference on both the groups, it was found that group A treatment was effective than group B on

analyzing with mean value. Flexion and extension range of motion of current study shows statistically improvement with p value of  $\geq 0.0001$ , while on assessing it with the mean difference, the flexion range of motion shows greater improvement than extension range. For this reason, untrained people demonstrate stiffer trunk extensor musculature than trunk flexor musculature. Because of difference in stiffness, it is reasonable that the application of the same training program would result in greater increases in trunk lumbar flexion mobility than in extension mobility. Finally when we compare both the groups, the result signifies that PNF is better suited for low back pain patients when compared to core stabilization exercises. The result of the current study established that both PNF and Core stability exercises were developed in both groups. Statistical results of both the groups were significant (p<0.05).

#### **CONCLUSION**

The study result concludes that rhythmic stabilization and combination of isotonic exercise shows greater improvement than core muscle stabilization exercises while on assessing with NPRS, Modified Schobber method and Oswestry low back pain disability index. This implies use of Rhythmic stabilisation and Combination of isotonic exercise to find a better improvement in clinical practice.

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Ethical approval: The study was approved by the

Institutional Ethics Committee

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