

Effectiveness of PNF Training for Chronic Low Back Pain

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Background: The primary goals of physical exercise in the management of chronic low back pain are to gain the muscle strength, flexibility and endurance, to restore injured tissues and to contribute to the ability to sustain normal life activities.⁵ Core serves as a muscular corset that works as a unit to stabilize the body and spine hence its strengthening helps to prevent and rehabilitate various lumbar spine and musculoskeletal disorders.⁶ PNF is very effective in improving flexibility, strength and range of motion in a damaged or stiff muscle¹. This study compared the effect of proprioceptive neuromuscular facilitation program versus core stabilization exercises for decreasing pain, improving flexibility and functional ability of the patients with chronic low back pain.

Design and setting: 60 subjects having low back pain for more than 3 months, between 20-50 year of age were randomized into two groups (group 1- PNF, group 2-core strengthening). For group 1 treatment were combination of Isotonic Exercises consisting of alternating concentric and eccentric contractions of the agonists without relaxation, three sets of 15 repetitions at maximal resistance were performed¹⁶ and Short Wave Diathermy given initially for 20-30²⁰ minutes on continuous mode²¹ to the low back. For group 2 treatment included SWD to low back pain region for 20-30²⁰ minutes on continuous mode⁴⁴ and Core Stability Exercises given for 2 weeks with 10 repetitions and the next 2 weeks as home program with 20 repetitions for each exercise.

Results: In the present study, the PNF group shows highly significant improvement in all the outcomes measures as compared to core strengthening when pre and post treatment parameters were compared after 4 weeks in Visual Analog Scale ($t = 2.006, p = 0.0502$), Modified Schober method (Flexion) ($t = 2.39, p = 0.0202$), Modified Schober method (Extension) ($t = 2.74, p = 0.0083$), Modified Oswestry Low Back Pain Disability Score ($t = 4.406, p < 0.0001$)

Conclusion: When we compare both the groups, the results signify that PNF program is better suited for chronic low back pain as compared to core stabilization exercises. Core Stability Exercises are as effective but not superior to, other modes of physiotherapy management in the treatment of chronic low back pain. We recommend that Investigation of long term effect of PNF program and Core Stability Exercises in Indian population with large number of sample and longer session is needed.

I. Introduction

Low backache is an extremely common symptom in the general population affecting up to 85% and is the most common disability in those under the age of 45 and the most expensive health problem in those between the ages of 20 to 50¹.

It is tiredness, discomfort, or pain in the low back region, with or without radiating symptoms to the leg or legs and categorized as acute, sub-acute and chronic low back pain².

Patients with chronic low back pain present with impaired psychomotor functioning such as decreased speed of information processing and poor postural control. They also experience more frequent and severe pain and have poorer scores for physical and social functioning than other low back pain patients and have adaptive changes related to long-term dysfunction. Therefore, when reviewing treatments for low back pain, chronic low back pain should be considered separately from acute and sub acute low back pain³.

The primary goals of physical exercise in the management of chronic low back pain are to gain the muscle strength, flexibility and endurance, to restore injured tissues and to contribute to the ability to sustain normal life activities⁵.

Core strengthening is a description of the muscular control required around the lumbar spine to maintain functional stability and particular attention has been paid to the core strengthening because the core serves as a muscular corset that works as a unit to stabilize the body and spine, with and without limb movement and hence its strengthening helps to prevent and rehabilitate various lumbar spine and musculoskeletal disorders⁶.

Neurophysiologic studies have linked pain development in the lumbar spine region with disturbances in the mechanoreceptors and probably with impairment of the superior proprioception centers^{7,8}. Therefore, exercise programs that enhance proprioception may be beneficial for managing chronic low back pain.

Proprioceptive neuromuscular facilitation is a concept of treatment whose underlying philosophy is that all human beings, including those with disabilities, have untapped existing potential (Kabat 1950). The primary goal of treatment is to help patients achieve their highest level of function⁹. PNF involves stretching, resisted movement, traction and approximation to ameliorate muscle decline, disharmony, atrophy and joint movement limitations¹⁰. Originally used as a rehabilitative therapy, it is very effective in improving flexibility, strength and range of motion in a damaged or stiff muscle¹¹. Recently, it has been used in orthopedic diseases of bones and joints (like lower back, neck and shoulder pain), sports related trauma and CNS diseases such as stroke and its usefulness has been reported in other medical fields^{12,13,14}

When PNF exercises are performed correctly, the client will eventually adapt them into their everyday movements, thereby sloppy postures and habits putting chronic strain on the muscles, causing soreness, stress and eventually leading to injury will be corrected and their muscle spasms and pain will decrease greatly¹⁵. There are different forms of PNF exercises. Two commonly used forms are rhythmic stabilization training (RST) and combination of isotonic exercises (COI). The RST technique uses isometric contraction of antagonistic patterns and results in co-contraction of the antagonists if the isometric contraction is not broken by the physical therapist. It is used mainly to manage conditions in which weakness is a primary factor and in which stabilization provides stimulation of the agonistic pattern¹⁶. The COI technique is used to evaluate and develop the ability to perform controlled purposeful movements. It involves the performance of alternating concentric, eccentric, and isometric contractions and is used to treat deficiencies in strength and range of motion¹¹.

Based on the above said concepts core stability and PNF have been practiced worldwide in the treatment of chronic low pain and were found effective individually, but these two were not compared to find out which is better in reducing pain and improving the functional ability of the patients.

Purpose of the study:

The purpose of this study is to compare the effect of proprioceptive neuromuscular facilitation program versus core stabilization exercises for decreasing pain, improving flexibility and functional ability of the patients with chronic low back pain.

AIM AND OBJECTIVES

AIM: To find out an effective method of treating chronic low back pain.

OBJECTIVES:

- 1) To study the effect of proprioceptive neuromuscular facilitation programme on decreasing pain, improving flexibility and functional performance in chronic low back pain patients.
- 2) To study the effect of core stabilization exercises on decreasing pain, improving flexibility and functional performance in chronic low back pain patients.
- 3) To compare the effectiveness of PNF program and Core stabilization exercises among chronic low back pain patients.

II. Materials and Methodology

STUDY TYPE: Comparative Study

STUDY SETTING: Out-patient department of Physiotherapy, Dr. D. Y. Patil Medical College Hospital & Research center, Pune.

SAMPLING DESIGN:

- 1) Block Randomization method was used.
- 2) Total 60 patients were selected out of which only 53 patients were able to complete the study.

SAMPLE SIZE: The total number of subjects in the study is n = 60, aged between 20 to 50 yrs.

SAMPLE POPULATION: Patients having Low back pain for more than 3 months of duration were included as per the inclusion criteria.

TARGET POPULATION: Patients with Low Back Pain.

SAMPLING CRITERIA:

Inclusion Criteria:

- Ages between 20 to 50 years were selected.
- Both male and female patients were selected.
- Patients having chronic low back pain with more than 3 months of duration.

- Low back pain with non-specific nature (mechanical) i.e. without identifiable specific anatomical or neurophysiological causative factors.

Exclusion Criteria:

- Patients with nerve root pain signs.
- Patients with spine pathology.
- Patients with previous spinal surgery.
- Spondylosis.
- Spondylolisthesis
- Past history of vertebral fractures
- Systemic disorders like tuberculosis of spine or rheumatoid arthritis.

MATERIALS USED:

- Plinth.
- Inch tape.
- Marker.
- Paper.
- Scale.
- Patient record form.
- Modified Oswestry Low back pain disability Questionnaire.

PROCEDURE:

Data Collection:

Subjects were evaluated at the beginning of the therapy and reevaluated after 4 weeks. This was done to note the changes after the treatment.

Table showing distribution of age and gender.

S.No	Category	Criteria	Group 1	Group 2	t = 0.28 p < 0.77 (NS)
1	Age	Mean	33.11	33.73	
		SD	8.10	8.01	
2	Gender	Male	15	14	
		Female	12	12	

It was found that there was no significant difference in basic parameters like Age & Gender.

OUTCOME MEASURES:

- **VISUAL ANALOGUE SCALE** - Visual Analogue Scale is a pain rating scale on which the patient is asked to rate his or her pain from 0 (no pain) to 10 (most severe pain imaginable). The line is 10 cms in length on which patients mark is measured from the left (no Pain) end of the scale and is recorded in centimeters. VAS has advantages over other methods in terms of feasibility and reliability¹⁷.
- **MODIFIED MODIFIED SCHOBER METHOD** -Modified modifiedSchober method is easier and quicker, less time taking, and a reliable method to obtain lumbar flexion and extension measurements in patients with Low Back Pain¹⁸.
- **MODIFIED OSWESTRY LOW BACK PAIN DISABILITY QUESTIONNAIRE**-This questionnaire has been designed to give information as to how your back pain has affected your ability to manage in everyday life and consists of 10 items addressing different aspects of function, each scored from 0 to 5, with higher values representing greater disability. The total score is multiplied by 2 and expressed as a percentage. This test is highly reliable¹⁹.

III. Method:

From the target population, the sample populations were selected based on the inclusion and exclusion criteria and were randomly allocated into two groups and the subjects were examined in detail including subjective and objective assessment.

Their evaluation was taken at the start of treatment and after 4 weeks of treatment in both the groups. The consent was obtained from the subject and the procedure was explained to them. 45 – 60 min per day for 4 weeks and 2 weeks of duration respectively and for the next 2 weeks the patients with core stability exercises group were taught home programs to be carried out at their home.

GROUP 1: (Proprioceptive neuromuscular facilitation group)

The treatment to this group of patients includes Combination of Isotonic Exercises and Short Wave Diathermy given initially for 20–30²⁰ minutes on continuous mode²¹ to the low back. The Combination of Isotonic Exercises program consists of alternating concentric and eccentric contractions of the agonists without relaxation. Resisted active concentric contraction for 5 seconds (trunk flexion), resisted eccentric contraction for 5 seconds (trunk flexion) and the resistance is maintained during contraction for 5 seconds (trunk flexion and extension). Three sets of 15 repetitions at maximal resistance were performed¹⁶.

- From the seated position, the subject flexes the trunk against manual resistance provided by the therapist.
- When maximal trunk flexion is achieved, the subject is instructed to maintain the position
- Upon maintenance of static position, the subject returns to the starting position (trunk extension) against resistance provided by the therapist

GROUP 2:(core stabilization exercise group)

The treatment of this group of patients includes Short Wave Diathermy given initially to low back pain region for 20-30²⁰ minutes on continuous mode⁴⁴ and Core Stability Exercises given for 2 weeks with 10 repetitions under the supervision of the therapist and the next 2 weeks as home program with 20 repetitions for each exercise.

1 week

- Curl up exercises^{6, 22, 23} – with one leg bent to about 90⁰ and other leg relaxed.
- Side bridges – lift the hips off the floor. Repeat to both sides.
- Leg and Arm Extension (Brid Dog Exercise) – from 4-point kneeling position raise the arm then return to beginning position and raise leg and again return to beginning position.

2 week

- Curl up exercise – with both knees bent about 90⁰ with raise the elbow off the floor.
- Side Bridges – lift both legs off the floor.
- Leg and Arm Extension – with alternate arm and leg extension from 4 – point kneeling position.

3– 4 weeks

Continue the same exercise with advance progression

- Curl up – with fingers on the fore head.
- Side bridge – Support yourself on right hand extended.
- Leg and arm extension – Alternate leg and Arm extension.

IV. Results

Statistical Analysis was done by using paired ‘t’ and unpaired ‘t’ test. Intergroup significance was calculated by using unpaired ‘t’ test & intragroup significance was calculated by using paired ‘t’ test.

In PNF group,

Paired ‘t’ test was applied at 26 degrees of freedom
 i.e. (n-1) = degree of freedom
 (27-1) = 26

In Core Stabilization Exercise group,

Paired ‘t’ test was applied at 25 degrees of freedom
 i.e. (26-1) = 25

To compare both the groups unpaired ‘t’ test was applied.

**TABLE -1
 COMPARISION OF PRE AND POST TREATMENT OF PNF GROUP VAS SCORE**

	Pre treatment	Post treatment
MEAN	7.37	1.98
SD	1.20	1.16

When pre and post treatment parameters were compared after 4 weeks, the PNF group showed highly significant difference in improvement of Visual Analog Scale.

- Visual Analog Scale Score (t = 23.67, p < 0.000)

GRAPH-1

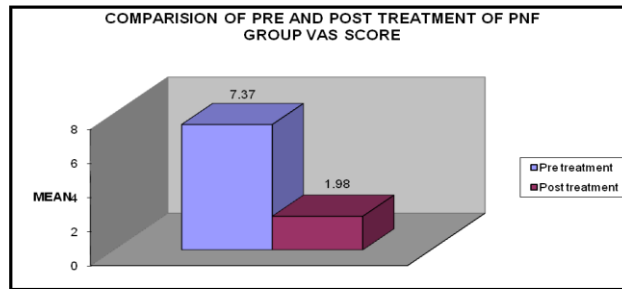


TABLE-2

COMPARISON OF PRE AND POST TREATMENT OF PNF GROUP MMS SCORE

	FLEXION		EXTENSION	
	Pre treatment	Post treatment	Pre treatment	Post treatment
MEAN	2.66	5.49	1.64	2.98
SD	0.99	1.17	0.71	0.67

When pre and post treatment parameters were compared after 4 weeks, the PNF group showed highly significant difference in improvement of flexion and extension range by modified modifiedSchober method.

- Modified modifiedSchober method (Flexion)- (t = 13.79, p< 0.0001)
- Modified modifiedSchober method (Extension)- (t = 8.21, p< 0.0001)

GRAPH-2

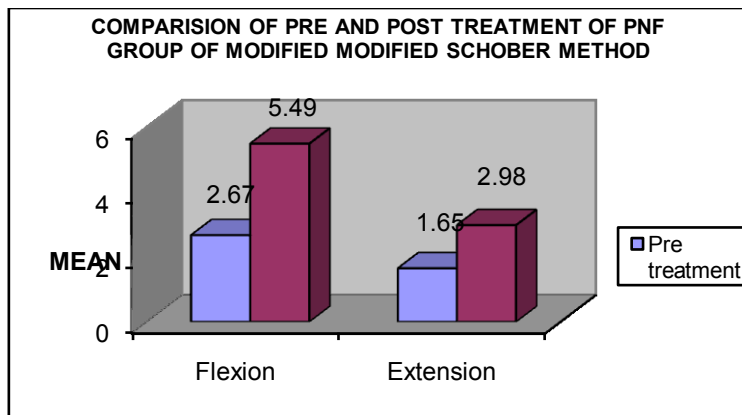


TABLE-3

COMPARISON OF PRE AND POST TREATMENT OF PNF GROUP MOSW SCORE

	Pre treatment	Post treatment
MEAN	68.51	26.59
SD	10.44	5.7

When pre and post treatment parameters were compared after 4 weeks, the PNF group showed highly significant difference in improvement of Modified Oswestry Low Back Pain Disability Questionnaire.

- Modified Oswestry Low Back Pain Disability Score- (t = 28.45, p<0.0001)

GRAPH-3

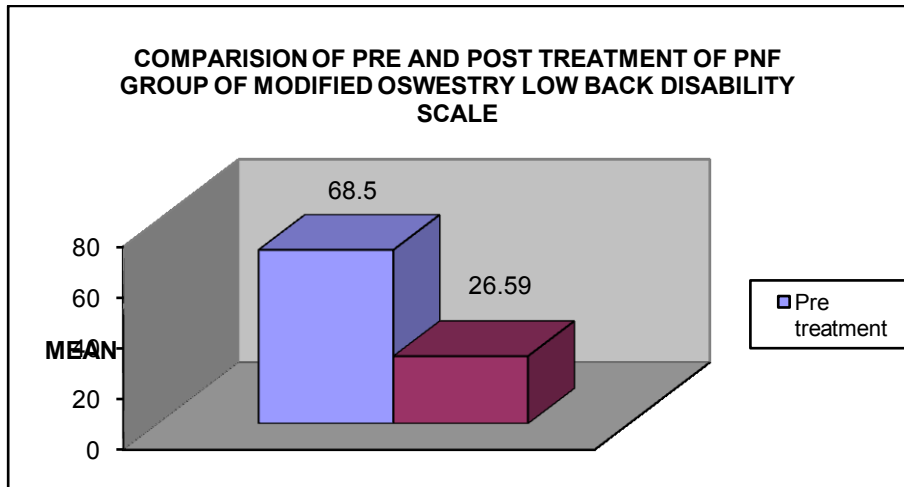


TABLE-4

COMPARISON OF PRE AND POST TREATMENT OF CORE STABILIZATION EXERCISE GROUP VAS SCORE

	Pre treatment	Post treatment
MEAN	7.40	2.62
SD	1.01	1.30

When pre and post treatment parameters were compared after 4 weeks, the PNF group showed highly significant difference in improvement of Visual Analog Scale.

- Visual Analog Scale (t = 24.41, p < 0.0001)

GRAPH-4

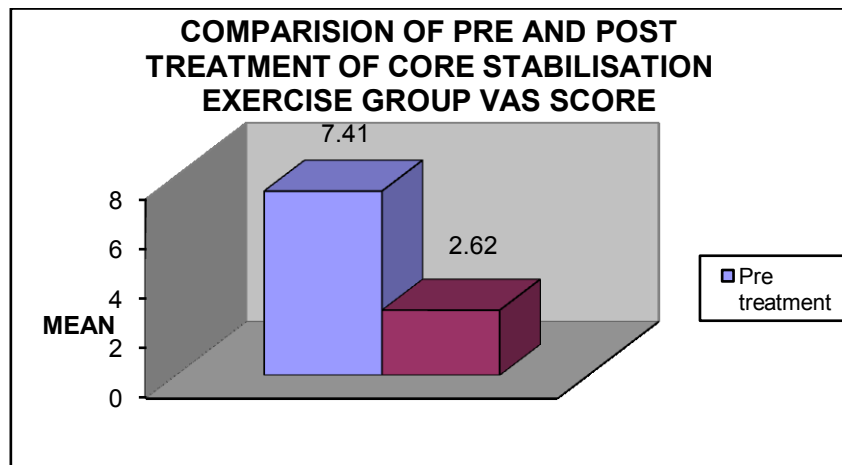


TABLE-5

COMPARISON OF PRE AND POST TREATMENT OF CORE STABILIZATION EXERCISE GROUP MMS SCORE

	FLEXION		EXTENSION	
	Pre treatment	Post treatment	Pre treatment	Post treatment
MEAN	2.66	4.76	1.77	2.56
SD	0.96	1.17	0.71	0.68

When pre and post treatment parameters were compared after 4 weeks, the PNF group showed highly significant difference in improvement of flexion and extension range by modified modifiedSchober method.

- Modified modifiedSchober method (Flexion)- (t = 9.63, p< 0.0001)
- Modified modifiedSchober method (Extension)- (t = 7.06, p< 0.0001)

GRAPH-5

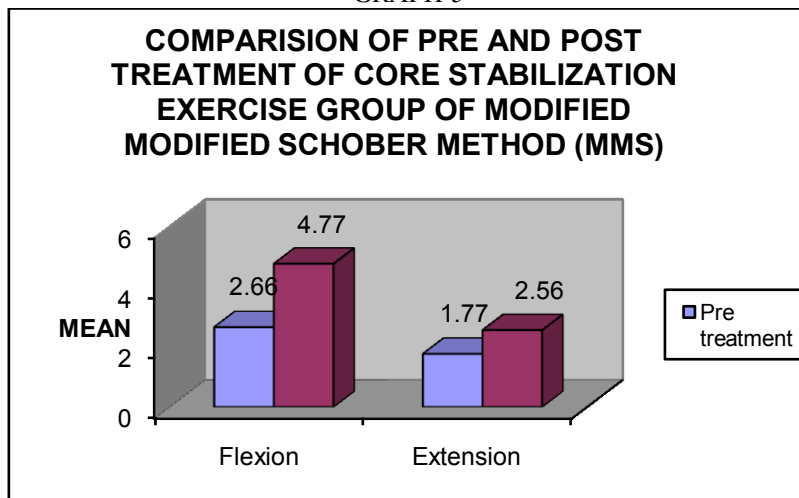


TABLE-6

COMPARISON OF PRE AND POST TREATMENT OF CORE STABILIZATION EXERCISE GROUP MOSW SCORE

	Pre treatment	Post treatment
MEAN	67.38	33.30
SD	9.04	7.10

When pre and post treatment parameters were compared after 4 weeks, the PNF group showed highly significant difference in improvement of Modified Oswestry Low Back Pain Disability Questionnaire.

- Modified Oswestry Low Back Pain Disability Score- (t = 34.89, p<0.0001)

GRAPH-6

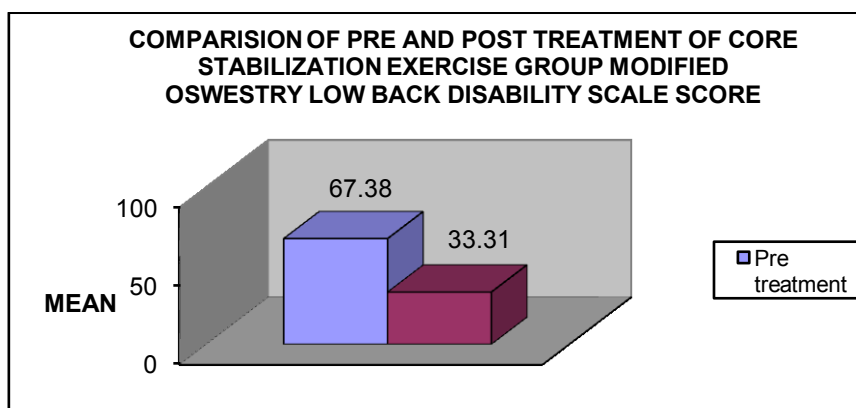


TABLE-7

COMPARISON OF DIFFERENCE BETWEEN PRE AND POST TREATMENT VAS SCORE OF BOTH GROUPS

	PNF Group	Core Stabilization Exercise Group
MEAN	5.38	4.78
SD	1.18	0.99

When the difference between pre and post treatment parameters of both PNF and Core Stabilization Exercise Groups were compared after 4 week showed no significant difference in improvement of Visual Analog Scale.

- Visual Analog Scale ($t = 2.006, p = 0.0502$)

GRAPH-7

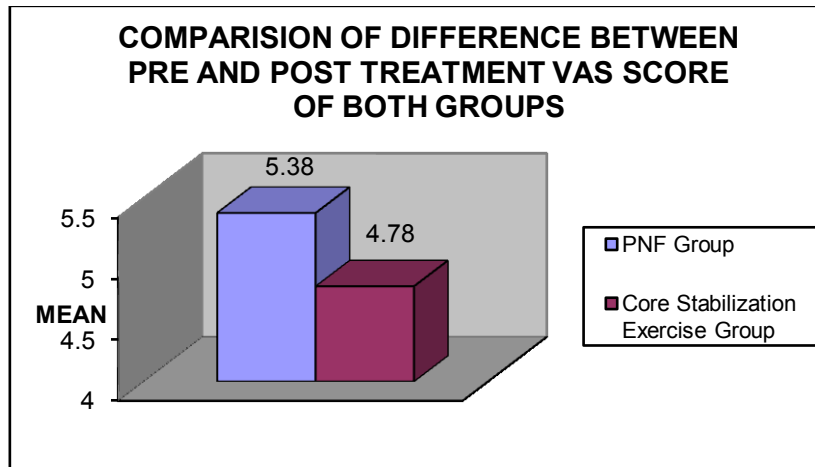


TABLE-8

COMPARISON OF DIFFERENCE BETWEEN PRE AND POST TREATMENT MMS SCORE OF BOTH GROUPS

	FLEXION		EXTENSION	
	PNF Group	Core stabilization exercise group	PNF Group	Core stabilization exercise group
MEAN	2.82	2.10	1.33	0.78
SD	1.06	1.11	0.84	0.56

When the difference between pre and post treatment parameters of both PNF and Core Stabilization Exercise Groups were compared after 4 week showed significant difference in improvement of Flexion and Extension done by Modified modifiedSchober method.

- Modified modifiedSchober method (Flexion)- ($t = 2.39, p = 0.0202$)
- Modified modifiedSchober method (Extension)- ($t = 2.74, p = 0.0083$)

GRAPH-8

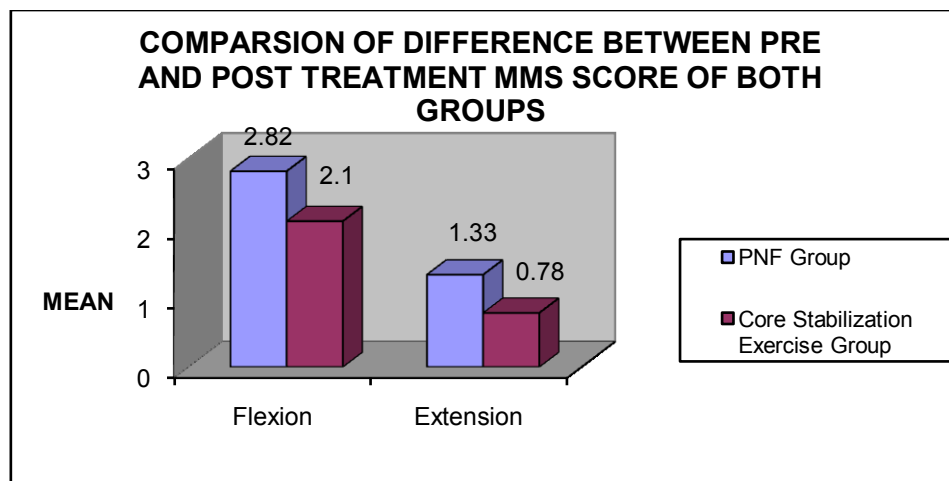


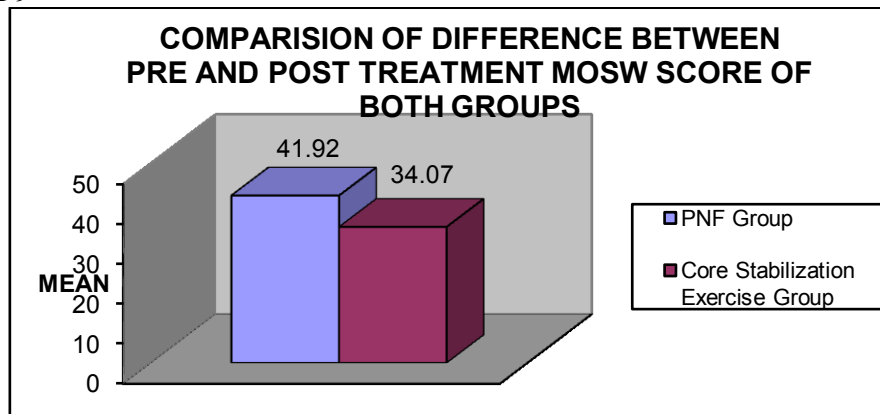
TABLE-9
COMPARISION OF DIFFERENCE BETWEEN PRE AND POST TREATMENT MOSW SCORE OF BOTH GROUPS

	PNF Group	Core Stabilization Exercise Group
MEAN	41.92	34.07
SD	7.65	4.97

When the difference between pre and post treatment parameters of both PNF and Core Stabilization Exercise Groups were compared after 4 week showed highly significant difference in improvement of Modified Oswestry Low Back Pain Disability Questionnaire.

- Modified Oswestry Low Back Pain Disability Score($t = 4.406, p < 0.0001$)

GRAPH-9



V. Results

Results Obtained:

On between both group comparison –

The subjects included in this study showed similar characteristics before starting the treatment for all parameters.

- Visual Analog Scale ($t = 0.12, p = 0.90$)
- Modified ModifiedSchober Method
- Flexion ($t = 0.01, p = 0.98$)
- Extension ($t = 0.61, p = 0.54$)
- Modified Oswestry Low Back Pain Disability Questionnaire
- ($t = 0.42, p = 0.67$)

The Pre and Post treatment parameters were compared in PNF group

When pre and Post treatment parameters were compared after 4 weeks, the PNF group showed highly significant difference in the improvement of all three parameters.

- Visual Analog Scale ($t = 23.67, p < 0.0001$)
- Modified ModifiedSchober Method
- Flexion ($t = 13.79, p < 0.0001$)
- Extension ($t = 8.21, p < 0.0001$)
- Modified Oswestry Low Back Pain Disability Questionnaire
- ($t = 28.45, p < 0.0001$)

The Pre and Post treatment parameters were compared in Core Stabilization Exercise group

When pre and Post treatment parameters were compared after 4 weeks, the Core Stabilization Exercise group showed highly significant difference in the improvement of all three parameters.

- Visual Analog Scale ($t = 24.41, p < 0.0001$)
- Modified ModifiedSchober Method
- Flexion ($t = 9.63, p < 0.0001$)
- Extension ($t = 7.06, p < 0.0001$)
- Modified Oswestry Low Back Pain Disability Questionnaire
- ($t = 34.89, p < 0.0001$)

The difference between Pre and Post treatment parameters were compared in PNF and Core Stabilization Exercise group

When the difference between pre and post treatment parameters of both group were compared after 4 weeks, there is significant improvement in Modified modifiedschober method and Modified Oswestry Low Back Disability Scale, but the Visual Analog Scale showed not significant.

- Visual Analog Scale (t = 2.00, p = 0.05)
- Modified ModifiedSchober Method
- Flexion (t = 2.39, p = 0.02)
- Extension (t = 2.7, p = 0.008)
- Modified Oswestry Low Back Pain Disability Questionnaire (t = 4.4, p < 0.0001)

Comparison between mean of the difference of Pre and Post treatment parameters value of PNF and Core Stabilization Exercise group

Sr.no	Test	PNF group	Core Stabilization Exercise group	't' value	'p' value
1.	VAS	5.38	4.78	t= 2.006	p=0.05
2.	Flexion (MMS)	2.82	2.10	t=2.39	p=0.02
	Extension (MMS)	1.33	0.78	t=2.74	p= 0.008
3.	MOSW	41.92	34.07	t=4.406	p<0.0001

Here, we can see that there is no significant difference between mean score of Visual Analog Scale of both group, but significant difference seen in Modified modifiedSchober method and Modified Oswestry low back pain disability scale showing the mean score of these parameters is larger in PNF group than Core Stabilization Exercise group.

VI. Discussion

In the present study, the PNF group shows highly significant improvement in all the outcomes measures

In PNF group the lumbar mobility, both in flexion and extension were improved in the mean value showing greater amount of significance (Tab. 2).The positive effects could be attributed to the nature of PNF exercises, which are designed primarily to maximize improvements in flexibility. Such exercises take advantage of the body's inhibitory reflexes to improve muscle relaxation which allows a greater stretch magnitude during stretch training, resulting in superior gains in flexibility.

Nick Kofotolis, Eleftherios Kellies, (2006) found that the COI group demonstrated greater lumbar mobility which could be attributed to the dynamic nature of the COI exercises, which used all muscle action types (eccentric, concentric, and isometric) through a progressively increased range of motion^{24,25}.

According to (Alter 1996), PNF is a technique involving combinations of alternating contractions and stretches. Whose goal is facilitation of the agonist muscle thereby increase the recruitment of additional motorneurons or increase the excitability of the motorneurons already in use. Agonist facilitation leads to inhibition (a decrease in the excitability) of the antagonist (the stretched muscle) resulting in the relaxation of the inhibited muscle and muscular resistance in the facilitated muscle²⁶.

As this COI exercises includes the resistance, it becomes the most effective proprioceptive facilitation, as muscle response to cortical stimulation increases (S.S Adler, D. Beckers). The magnitude of that facilitation is related directly to amount of resistance.

Myers JB, Lephart SM (2000) – had stated that PNF is a normalized, facilitated training method for muscles that involves stretching, resisted movement, traction (separating the joint surface), and approximation (compressing the joint surface) to ameliorate muscle decline, disharmony, atrophy and joint movement limitations¹⁰.

PNF group also showed an improvement in functional ability (Tab.3) (as registered by Oswestry Index) could be seen as a direct result of flexibility and endurance improvements, thereby providing further support for the effectiveness of PNF exercises for chronic low back pain treatment.

Despite the improvements in muscle mobility and functional ability, the visual analog scale (Tab.1) showed similar improvements in this group. As the supporting studies mentioned that back pain intensity decreased significantly.

Neurophysiologic studies have linked pain development in the lumbar spine with disturbances in the mechanoreceptors and probably with impairment of the superior proprioception centers^{7,8} therefore, exercise programs that enhance proprioception may be beneficial for managing CLBP.

Also the reduction in pain may be due to application of short wave diathermy. (Wagstaff 1986) In continuous mode of short wave diathermy, there is sensation of warmth because of accumulation of heat in the tissues²⁷. Therapeutic effects arise through specific tissue temperature increase of 1°C from a baseline temperature of 37°C leading to increase in metabolic rate. Tissue temperature increases produce an increase in blood flow and a decrease in pain, muscle spasm, and inflammation (Draper and Ricard, 1995; Lehmann et al., 1970)^{28,29}

In the present study, the second group i.e Core Stabilization Exercise group shows highly significant improvement in all the outcomes measures.

These exercises have very significant effect on the pain and lumbar mobility. As the pain is decreased (Tab.4) and lumbar mobility is increased (Tab.5), it could be attributed to the several other reported benefits through the use of diathermy as explained earlier. Also (Low, Ann Reed) said that viscosity of tissues will be reduced, which partly accounts for the reduction of joint stiffness that occurs with heating.

Hodges and Richardson (1996) showed that the deep trunk muscles, Transversus Abdominis (TA), multifidus (MF), Internal Oblique (IO), Para spinal, pelvic floor are key to the active support of the lumbar spine. The co-contraction of these muscles produce forces via the "thoracolumbar fascia" (TLF) and the "intra-abdominal pressure" (IAP) mechanism which stabilize the lumbar spine, and the Para spinal and MF muscles act directly to resist the forces acting on the lumbar spine. The co-contraction of the TA and MF muscles occurred prior to any movement of the limbs suggesting that these muscles anticipate dynamic forces which may act on the lumbar spine and stabilize the area prior to any movement²³.

In the present study, in both the groups, when we compare the lumbar flexion and extension measurement statistically it is indicated that lumbar flexion measurement is more than the extension. (Tab.2 & Tab.5) which would seem to be related to the fact that there is generally less available lumbar range of motion in extension than in flexion. These findings could be attributed to the fact that trunk extensor musculature works more statically and has a higher proportion of connective tissue than does trunk flexor musculature³⁰. For this reason, untrained people demonstrate stiffer trunk extensor musculature than trunk flexor musculature³¹.

Finally when we compare both the groups, the results signify that PNF program is better suited for chronic low back pain as compared to core stabilization exercises.

Nick Kofotolis (2006) further support our study that short term PNF program are particularly effective in improving trunk muscle endurance and mobility as well as in reducing back pain symptom and improving functional performance in people with chronic low back pain¹⁴.

Rackwitz et al (2006) – found that for chronic low back pain, spinal stability exercises are more effective than GP treatment and as effective as other physiotherapy treatments in reducing pain and disability, thus supporting the Core stability exercises group³².

From the methodological point of view, the frequency and duration of the studied intervention (5 times per week for 4 weeks) were deemed appropriate to produce demonstrable benefits. Attempt was made to avoid confounding the results by balancing the exercise dosages between the groups. Exercises were administered for both groups and classes were supplemented with exercise leaflets to maintain the motivation. The relatively high level of adherence both during classes and at home confirms patient motivation to complete the exercise programme.

VII. Conclusion

The Proprioceptive Neuromuscular Facilitation Programme and Core Stabilization Exercises, both the groups showed highly significant difference of pre and post treatment. But when both these group were compared, the results of PNF group is statistically larger than Core Stabilization Exercise group. So, the Combination of isotonic PNF programme may be better suited for patients with chronic low back pain.

Core Stability Exercises are as effective but not superior to, other modes of physiotherapy management in the treatment of chronic low back pain. They can be incorporated into general exercise programmes or provided through one-to-one treatment sessions.

LIMITATIONS

The exercise programs applied in the present study were short term intensive programs and such programs focusing on improvement may not be permanent. Although often patients are mainly interested in a fast recovery, effects over the long term may be less distinctive due to, for example, recurrence of symptoms.

Recommendations: Investigation of long term effect of PNF programme and Core Stability Exercises in Indian population with large number of sample and longer session is needed.

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