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Effectiveness Of Mckenzie Exercises Versus Lumbar Stabilization Program in Patients with Lumbar Radiculopathy

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Abstract:

BACKGROUND: Radiculopathy or nerve root pain arise from disc herniation, spinal stenosis radiating down the leg in a dermatomal pattern. This study focuses on disability, pain and range of motion of spine The study evaluates "The effectiveness of McKenzie technique versus Lumbar stabilization on reducing symptoms and disability of Lumbar radiculopathy.

OBJECTIVE: The purpose of the study is to evaluate the effectiveness of McKenzie technique and Lumbar stabilization for the patients with Lumbar radiculopathy.

METHODOLOGY: This study included 30patients, they were divided into Group A and Group B. Group A given McKenzie technique and Group B given Lumbar stabilization exercise. Pain was assessed using Visual analogue scale (VAS), Functional disability was measured using Oswestry disability index and Range of motion by Schober test.

RESULT: The results between pre-treatment and post-treatment scores of pain and disability are considered. The mean and standard deviation are taken for both the Group A and Group B. The Group A showed better improvement in mean &standard deviation using Visual Analogue Scale, Oswestry disability index scores and Range of motion value than the Group B.

CONCLUSION: Both groups showed better improvement in reducing pain and functional disability. This study proved that Group A showed better improvement in reducing pain and reducing functional disability when compared to Group B.

KEYWORDS: Radiculopathy, McKenzie technique, chronic low back pain, Oswestry disability index, Lumbar stabilization exercise, Visual analogue scale

I. INTRODUCTION

Radiculopathy or nerve root pain occurs due to disc herniation which causes pain in the lower back and radiates down the back of the thigh up to leg. This damage is due to compression of nerve roots of the spine in the level of L1-S1 this result in the tingling, radiating pain, numbness, and occasional shooting pain. The prevalence of cervical and lumbar radiculopathy is high, but it mostly occurs in the lower back region. [1,2].

Generally lumbar radiculopathy is often referred as sciatica, a pain syndrome caused by compression or irritation of sciatic nerve roots by intervertebral disc degeneration or herniation. The nerve root inflammation and impingement are causes due to intervertebral disc herniation, cysts and narrowing of the spinal canal in the majority of cases.[3]

Lumbar radiculopathy is more common in men which has Risk factors like driving occupations, frequent lifting especially with twisting motions, back trauma, obesity, smoking, history of back pain and chronic cough. Lumbar radiculopathy is the most common complaints evaluated by surgeon states that the prevalence has been affecting 3%-5% of population got affected with lumbar radiculopathy in both male and female population.2-5%in men and 1-3%in women. [5]

There are various treatment options are available for lumbar radiculopathy such as non-steroidal anti-inflammatory drugs, opioid medicines and muscle relaxants and steroid injections in the spine although it's proved that conservative management will be more effective than treating with injections and other surgical methods. [4]

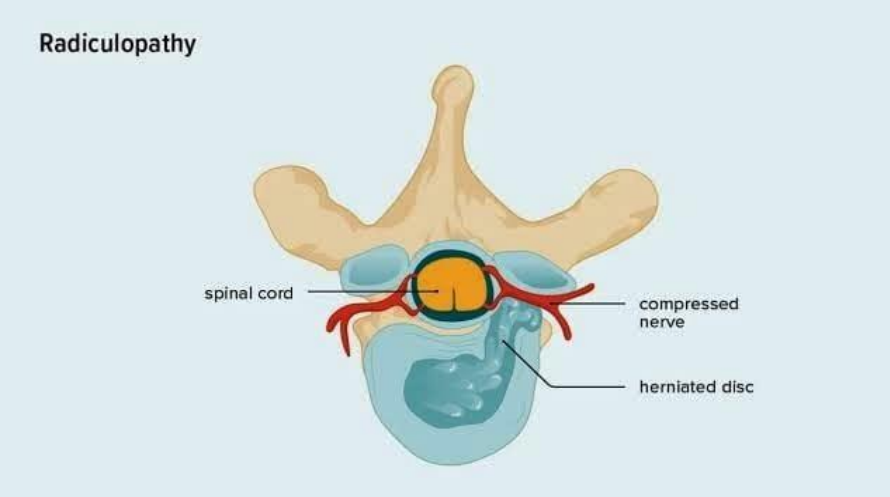
McKenzie method of diagnosis and treatment is a physiotherapy approach that can be used for the treatment of spinal pain. [10] Especially for radicular symptoms. McKenzie approach is helpful to centralize pain or decrease pain in patients through a repeated functional activity to lead a healthy living. [8]

Lumbar stabilization exercise is used in the treatment of patients with segmental instability and lumbar pain. Lumbar stabilization exercise can be very effective for improving neuromuscular control, strength, and endurance of the muscles and managing chronic pain and stabilization. These aim to decrease or managing joint instability which lead to pain, spinal conditions, or damage to neurological structures. Lumbar stabilization exercises are effective treatment compared with walking, stretching/general exercise. [9]

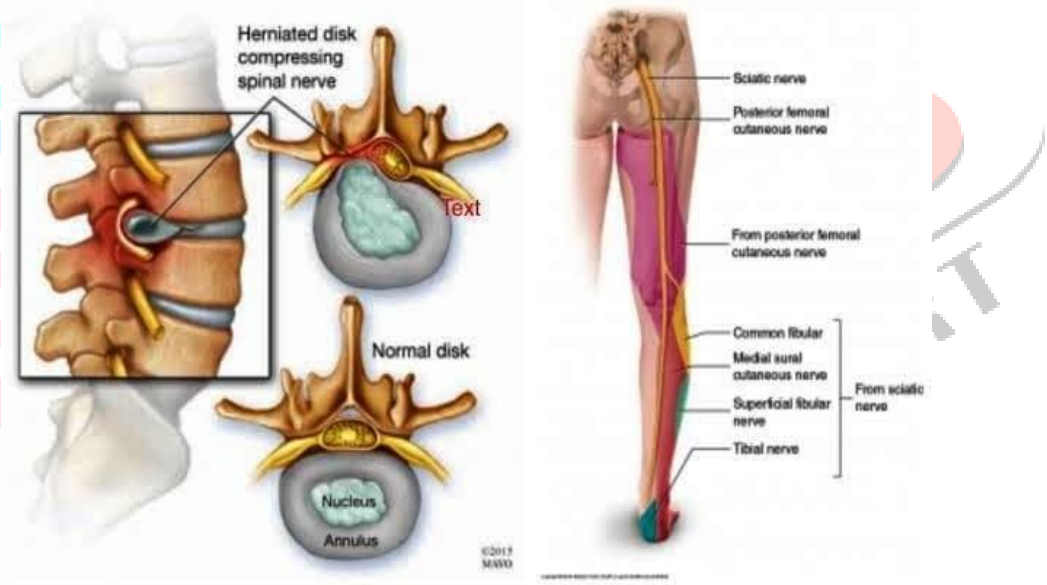
Even through it is shown to be effective in the treatment of radicular symptoms. There is no conclusive evidence for the use of specific repeated motions for treating lumbar radiculopathy. [12]

The purpose of the study was to find the effectiveness of McKenzie and Lumbar stabilization exercise on chronic low back pain patients with lumbar radiculopathy. To reduce lumbar radiculopathy, maintaining physical fitness and regular exercise program is necessary to Maintaining good posture and doing day to day activities, taking part in sports will restrict lumbar radiculopathy. [13]

Larger comparative study states that other therapeutic such as lumbar vertical traction and Transcutaneous electrical nerve stimulation with mobilization exercise can be performed as an effective treatment option. [14] It aimed that McKenzie exercise and lumbar stabilization exercise for lumbar radiculopathy can reduce pain and improve the functional active daily living activity in the treatment of lumbar radiculopathy



LUMBAR RADICULOPATHY - PATHOPHYSIOLOGY



2.1 Methodology

STUDY DESIGN : Experimental study.
STUDY POPULATION **:** Lumbar radiculopathy patient of age group between 25 to 60.
STUDY DURATION **:** 6 weeks.
STUDY SETTING **:** SRI ISHARI VELAN MISSION HOSPITAL
SAMPLE SIZE **:** 30 patients.

2.2 INCLUSION CRITERIA:

- Patients with low back pain and symptoms extending distal to gluteal region on lower extremity.
- Patients age group from 35 to 60 years.
- Male and female patients were chosen.
- Patients with mild and moderate pain were chosen.
- Patients with positive slump test.

2.3 EXCLUSION CRITERIA:

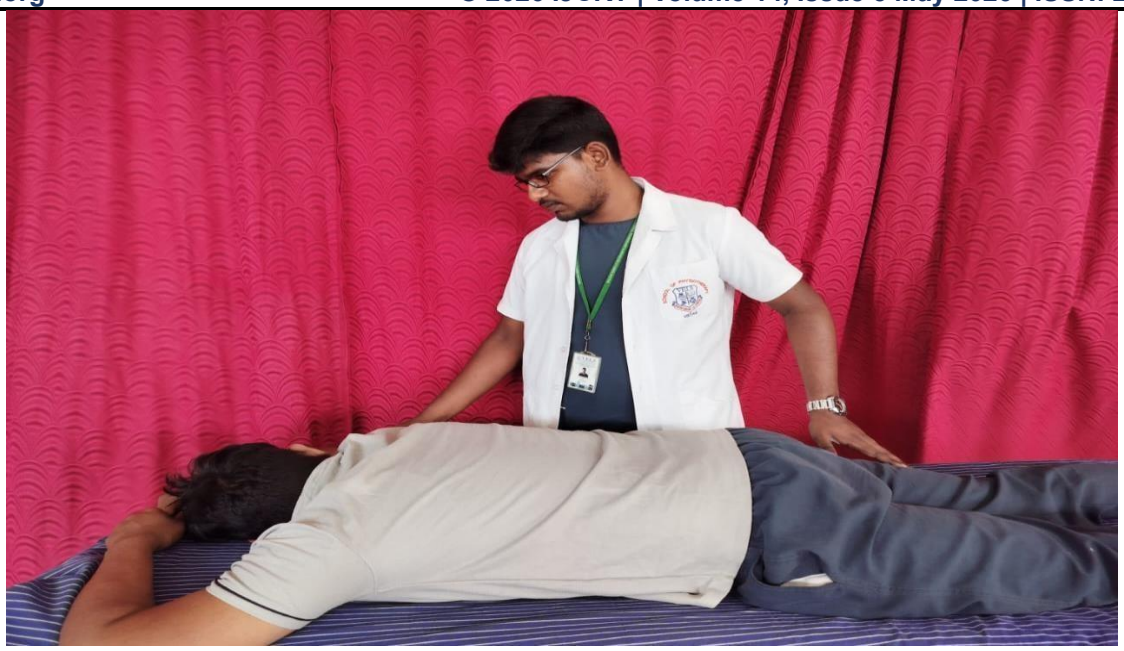
- Patients with inflammatory, infection, metabolic disease of spine and malignancy.
- Individuals with recent surgeries were excluded.
- Cauda equina syndrome.
- Patients with recent surgery on the spine.
- Cardiovascular disorder and psychological pain.

PROCEDURE:

- 30 patients were chosen for the experiment based on the inclusion and exclusion criteria, and their informed consent was obtained.
- Patients were divided into two groups of 15 members each of Group A-McKenzie Technique Group B- Lumbar stabilization exercise.
- Patients were evaluated on the first day of therapy, and they were reassessed four weeks after treatment ended.
- During four weeks patients underwent McKenzie technique, and lumbar stabilization exercise were taught to them so they repeat them as necessary.
- Participants degrees of discomfort and disability were assessed after a 4-week therapy session. Statistics were used to analyse the pre-test and post-test values.

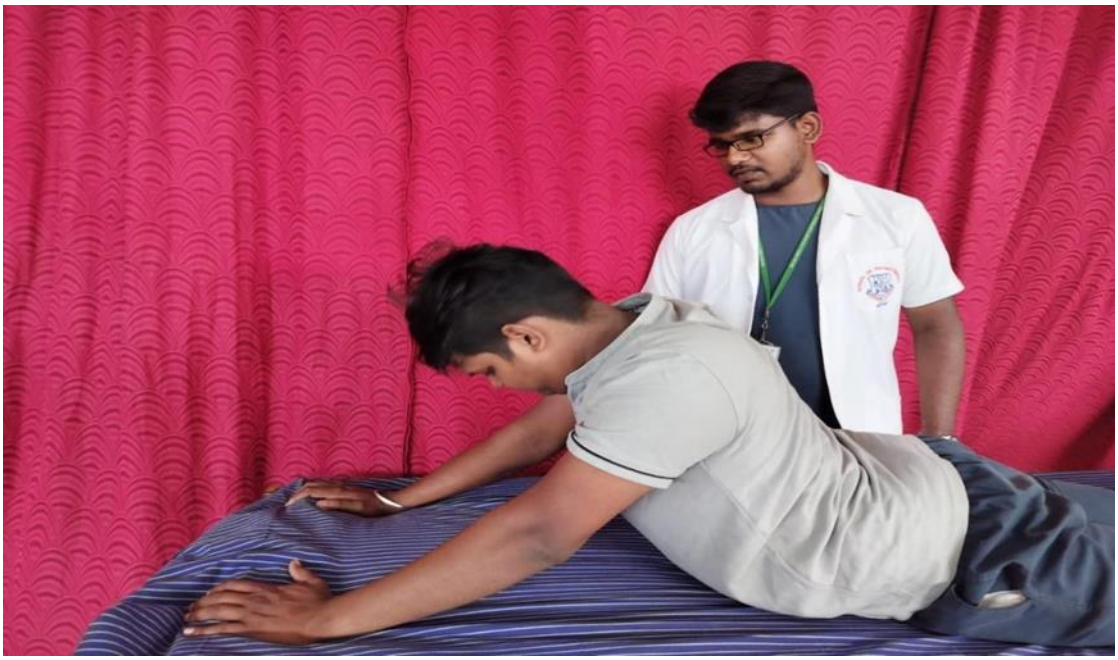
MCKENZIE TECHNIQUE (GROUP A).

- The McKenzie technique involves participants reclining on their stomachs on the treatment table to alleviate and centralize symptoms.
- The aim is to achieve symptom centralization through sagittal extension forces progressing rapidly, followed by patient's overpressure to gain full range.
- Extension exercises are progressed based on tolerance, starting with static prone positioning, if any symptoms noted the next stage involves lying prone in extension (prone on elbow) subsequent progression include extension in lying (prone on hands with elbow).
- The final step involves extension in lying with patients over pressure where the patient sags their hips and breathes out fully for maximal extension, completing the reductive process.
- Subjects tolerating the full program perform three sets of ten repetitions of repeated end-range extension in the prone position.



STATIC PRONE POSITION

PRONE ON ELBOW

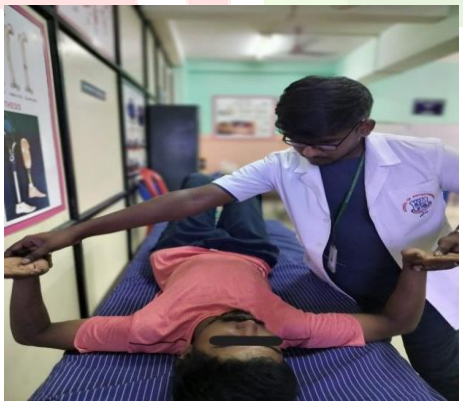


EXTENSION IN LYING

EXTENSION IN LYING WITH OVERPRESSURE

LUMBAR STABILIZATION EXERCISE (GROUP B):

- The participants in the Lumbar stabilization exercise group underwent a lumbar stabilization exercise program, engaging in three sessions per week over six weeks, totalling 18 sessions.
- Each session, lasting 60 minutes, included a 10-minute warm-up and concluded with a 5-minute cool-down. The initial phase focused on activating abdominal wall musculature, with the physical therapist providing detailed verbal and visual instructions through a brochure for each exercise's start and finish positions. Subjects practiced "hollowing" with therapist guidance until confident.
- Exercise progression was individualized based on capacity, exhaustion, and pain, following a program with variations in exercise order and difficulty levels. The exercises involved 1 to 3 sets, 8 to 15 repetitions, and contractions lasting 5 to 10 seconds, with 2–3-minute rest intervals between exercises.
- The exercises encompassed quadruped, side-lying, supine, and upright positions, targeting various trunk muscles, and progression occurred based on specific criteria.



RESULTS:

In Table 1, On comparing mean values of GROUP-A and GROUP-B on Visual Analogue Scale shows highly significant improvement in the post-test mean but GROUP-A shows (3.00) lesser mean value is more effective than GROUP-B (4.73) at P≤0.001, Hence the null hypothesis is rejected.
In Table 2, On comparing mean values of GROUP-A and GROUP-B on The Oswestry Disability Index Questionnaire score shows highly significant improvement in the post-test mean but GROUP-A shows (40.67) lesser mean value is more effective than GROUP-B (49.73) at P≤0.001, Hence the null hypothesis is rejected.
In Table 3, On comparing mean values of GROUP-A and GROUP-B on Schober's Test score shows highly significant improvement in the post-test mean but GROUP-A shows (5.49) higher mean value is more effective than GROUP-B (4.00) at P≤0.001, Hence the null hypothesis is rejected.
In Table 4 & 5, On comparing Mean Values of Visual Analogue Scale, Oswestry Disability Index Questionnaire and Schober's Test scores Between pre-test and post-test within the Group-A and Group-B shows highly significant difference at p≤ 0.001. Hence the null hypothesis is rejected.

DISCUSSION:

The aim of this study was to compare the effectiveness of McKenzie Technique (Group A) and Lumbar stabilisation exercise (Group B) in patients with Lumbar radiculopathy. The current study shows that both the groups significantly improved the pain severity and disability.
In this Study, Group A McKenzie Exercise protocol provided immediate pain relief and improvement in range of motion (ROM) as it corrects the positional fault in facet joint. The study was designed to find out effect of a McKenzie technique and lumbar stabilization in low back pain participants with radiculopathy.
Dr. Sanjana and Dr. R Yatish. (2021): The result of the study showed that along with TENS and McKenzie technique is significant in decreasing pain, improving functional ability, and increasing spinal range of motion in chronic low back pain with radiculopathy.
In Group A, McKenzie technique was provided. It reduced the pressure on the posterior element of the lumbar spine. This exercise restore motion and strengthen lower back and is helpful in relieving pain and preventing reoccurrence of low back pain. It also strengthens the abdominal and back muscles which maintain all structural alignment and prevent the over loading of the posterior element of the lumbar spine. Posture is a vital component for the management of low back pain during the working environment and daily living.
Pain intensity, functional disability and range of motion was measured before therapy for both the groups, with patients who had low back pain, which was measured by visual analogue Scale (VAS), functional disability index (Oswestry Disability Index) and Range of motion by (Schober's test). Improvement in pain after therapy was found in both the groups as of those with severe pain to moderate pain and moderate pain to partial pain.
In my study, 15 patients from Group A with McKenzie exercise sessions provided significant improvement ($p<0.001$), 15 patients from Group B are given number of William's Flexion exercise sessions and significant improvement ($p<0.001$)) in pain intensity is found in these who took sessions.
The Results of the study highlighted that McKenzie (Group A) was beneficial for most of the participants in the study. These exercise with these sessions showed significant improvement in pain intensity and functional ability.
Visual analogue Scale shows that both the groups improved significantly in the severity of pain. There isn't any major significant difference between the Groups. Group A shows some better improvements than Group B.
Oswestry Disability Index shows that both the groups improved significantly in the functional ability. There isn't any major significant difference between the Groups. However, Group A shows better improvements than Group B.
Schober test shows that both the groups improved significantly in the Range of motion. There isn't any major significant difference between the Groups. However, Group A shows better improvement than Group B.

CONCLUSION:

Both groups showed better improvement in reducing pain and disability. GROUP-A showed better improvement in reducing pain and disability. When compared to GROUP-B.

The subjects of both groups showed improvement in their VAS, ODI, ROM. But Group A showed statistically more improvement when compared to Group B. McKenzie technique is significant in decreasing pain, improving functional ability, and increasing spinal range of motion in low back pain with radiculopathy.

However, we conclude that MCKENZIE TECHNIQUE is more effective than LUMBAR STBILIZATION EXERCISE in Lumbar Radiculopathy in terms of reducing pain, increasing range of motion and improving functional ability in patients with Lumar Radiculopathy.

TABLE 1

COMPARISON OF VISUAL ANALOGUE SCALE SCORE BETWEEN GROUP – A AND GROUP – B IN PRE-TEST AND POST TEST

VAS	GROUP A		GROUP B		t-TEST	SIGNIFICANCE
	MEAN	SD	MEAN	SD		
PRE-TEST	6.40	1.12	6.47	1.24	0.154	.879*
POST TEST	3.00	1.25	4.73	1.16	3.926	.000**

(*- P > 0.05, **- P ≤ 0.001)

The above table reveals the Mean, Standard Deviation (S.D), t-test and p-value of the Visual Analogue Scale score between (Group A) & (Group B) in pre-test and post-test.

This table shows that there is no significant difference in pretest values of the Visual Analogue Scale score between Group A & Group B (*P > 0.05).

This table shows that there is a significant difference in post-test values of the Visual Analogue Scale score between Group A & Group B (**P ≤ 0.001).

Both the group shows significant decrease in the post-test means but (GROUP-A) which has the lesser mean value is more effective than (GROUP-B).

TABLE 2

COMPARISON OF OSWESTRY DISABILITY INDEX QUESTIONNAIRE SCORE BETWEEN GROUP – A AND GROUP – B IN PRE-TEST AND POST TEST

OSWESTRY DISABILITY INDEX QUESTIONNAIRE	GROUP A		GROUP B		t-TEST	SIGNIFICANCE
	MEAN	SD	MEAN	SD		
PRE-TEST	51.33	6.53	53.33	5.53	0.905	.373*
POST TEST	40.67	9.52	49.73	5.65	3.172	.000**

(*- P > 0.05, **- P ≤ 0.001)

The above table reveals the Mean, Standard Deviation (S.D), t-test and p-value of the Oswestry Disability Index Questionnaire Score between (Group A) & (Group B) in pre-test and post-test.
This table shows that there is no significant difference in pre-test values of the Oswestry Disability Index Questionnaire score between Group A & Group B (*P > 0.05).
This table shows that there is a significant difference in post-test values of the Oswestry Disability Index Questionnaire score between Group A & Group B (**P ≤ 0.001).
Both the group shows significant decrease in the post-test means but (GROUP-A) which has the lesser mean value is more effective than (GROUP-B).

TABEL-3

COMPARISON OF SCHOBER'S TEST SCORE BETWEEN GROUP – A AND GROUP – B IN PRE-TEST AND POST TEST

SCHOBER'STEST	GROUP A		GROUP B		t-TEST	SIGNIFICANCE
	MEAN	SD	MEAN	SD		
PRETEST	2.97	0.79	2.87	0.60	0.335	.740*
POST TEST	5.49	0.76	4.00	0.74	5.443	.000**

The above table reveals the Mean, Standard Deviation (S.D), t-test and p-value of the Schober's Test score between (Group A) & (Group B) in pre-test and post-test.

This table shows that there is no significant difference in pre-test values of the Schober's Test score between Group A & Group B (*P > 0.05).

This table shows that there is a significant difference in post-test values of the Schober's Test score between Group A & Group B (**P ≤ 0.001).
Both the group shows significant increase in the post-test means but (Group -A) which has the higher means values is more effective than (Group – B).

TABLE-4

COMPARISON OF VISUAL ANALOGUE SCALE, OSWESTRY DISABILITY INDEX QUESTIONNAIRE AND SCHOBER'S TEST SCORES BETWEEN PRE-TEST AND POST TEST WITHIN GROUP – A

GROUP – A	PRE-TEST		POST TEST		t-TEST	SIGNIFICANCE
	EAN	SD	MEAN	SD		
VISUAL ANALOGUE SCALE	6.40	1.12	3.00	1.25	15.902	.000*
OSWESTRY DISABILITY INDEX QUESTIONNAIRE	51.33	6.53	40.67	9.52	6.959	.000*
SCHOBER'S TEST	2.97	0.79	5.49	0.76	14.979	.000*

The above table reveals the Mean, Standard Deviation (S.D), t-value and p-value between pre-test and post-test within Group – A.

There is a statistically highly significant difference between the pre-test and post-test values of Visual Analogue Scale, Oswestry Disability Index Questionnaire and Schober's Test scores within Group - A (*- $P \leq 0.001$).

TABLE-5

COMPARISON OF VISUAL ANALOGUE SCALE, OSWESTRY DISABILITY INDEX QUESTIONNAIRE AND SCHOBER'S TEST SCORES BETWEEN PRE-TEST AND POST TEST WITHIN GROUP – B

GROUP – B	PRE-TEST		POST TEST		t-TEST	SIGNIFICANCE
	MEAN	SD	MEAN	SD		
VISUAL ANALOGUE SCALE	6.47	1.24	4.73	1.16	14.666	.000*
OSWESTRY DISABILITY INDEX QUESTIONNAIRE	53.33	5.53	49.73	5.65	3.829	.000*
SCHOBER'S TEST	2.87	0.60	4.00	0.74	7.077	.000*

(*- $P \leq 0.001$)

The above table reveals the Mean, Standard Deviation (S.D), t-value and p-value between pre-test and post-test within Group – B.

There is a statistically highly significant difference between the pre-test and post-test values of Visual Analogue Scale, Oswestry Disability Index Questionnaire and Schober's Test scores within Group - B (*- $P \leq 0.001$).

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CONFLICT OF INTEREST: Nil
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