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To Compare the Effect of PNF Stretching and Core Stabilizing Exercise Versus McKenzie Technique in Subjects with Low Back Pain

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ABSTRACT

Introduction: Low back pain is an extremely common symptom in the general population affecting up to 85% and isthe most common disability in those under the age of 45 and the most expensive health problem in those between the ages of 20 to 50. Low back problems have been identified as the leading cause of disability and absenteeism in the working population (Goldberg et al., 1980; Haber, 1971; Troup, 1965). Nachemson (1971)

Purpose of the Study: The purpose of the study is to improve the effect of treatment with pnf stretching and core stabilization control exercise than compared to McKenzie exercises for improving the low back pain.

Methodology: 30 subjects having radiological diagnosis of low back pain were selected according to the inclusion criteria. Decreasing pain and increasing ROM of the lumbar spine with the help of VAS and SCHOBER test. The subjects of group A received PNF stretching and core stabilization exercise and second group B received with mckenzie technique in low back pain. The post intervention data was compared with pre-intervention data and improvement of ROM is measured. All the participants were explained about the purpose of study. The subjects were screened for inclusion and exclusion criteria and then the baseline measurement was taken. An informed consent was taken from patients who were willing to participate in the study. Eligible subjects were randomly allocated into two groups of group A received PNF stretching and core stabilization exercise and second group B received with mckenzie technique in low back pain. The study was of 6 week at department of physiotherapy in SMIH.

Results: A statistically significant difference in improvement was noted within the groups and between the groups in terms of visual analogue (p0.05).

Conclusion: PNF Stretching with core stabilization control exercise and mckenzie technique both shows improvement in low back pain but Mckenzie technique shows more improvement in centralizing the pain and ROM in low back pain after 6 weeks of therapy.

Keywords: Low back pain; PNF; VAS; Core Stabilization; Mckenzie & Schober test.

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INTRODUCTION

Low back pain is an important public health, social and economic problem. It is a disorder with many possible etiology, occurring in different groups, and also a common health condition in the working population in India, occurrence of low back pain is also alarming. Nearly 60 percent of the people of India have significant back pain at some time or the other in their lives. Approximately 35% people suffer from chronic back pain, which significantly hampers their day-darroutine.[1]

Low back pain remains the primary cause of absenteeism and disability in ever industrialized society. Patients who develop chronic low back pain and disability persisting for more than (three months) use more than 80 percent of all health care for back pain.[2]

Non-specific low back pain is defined as low back pain not attributable to a recognizable, known specific pathology (example – infection, tumor, osteoporosis, fracture, structural deformity, inflammatory disorder, radicular syndrome, or caudaequina syndrome). Non-specific LBP is usually classified according to duration as acute (less than 6 weeks), sub acute (between 6 weeks and 3 months) or chronic LBP (longer than 3 months).[3]

Low backache is an extremely common symptom in the general population affecting up to 85% and isthe most common disability in those under the age of 45 and the most expensive health problem in those between the ages of 20 to 50. It is tiredness, discomfort, or pain in the low back region, with or without radiating symptoms to the legor legs and categorized as acute, sub-acute and chronic low back pain.[4]

Low back problems have been identified as the leading cause of disability and absenteeism in the working population (Goldberg et aI., 1980; Haber, 1971; Troup, 1965). Nachemson (1971) estimates that 70% to 80% of the world's population experience disabling low back pain at some time in their life. Furthermore, a majority of these episodes occur in individuals between the ages of 20 and 55years, with 56% experiencing their initial symptom during the second decade of life (Chaffin, 1975; Hirsch et al, 1969; Horal, 1969).[5]

A commonly used exercise therapy for LBA was developed by Brian Mckenzie, which was recognized as Mckenzie method (Mckenzie, 2011). A systematic review study reported that Mckenzie therapy is more effective than the comparison treatment at short-term follow up for spinal pain. Mckenzie method can be a familiar treatment and is one of the common choices used by most physiotherapists for treating low back pain.[6]

The passage lists several factors that can contribute to the development of low back pain, including physical factors (e.g., heavy physical strain), social demographic characteristics, individual factors (e.g., lifestyle, gender, age, race, genetic factors), habits (e.g., smoking, alcohol consumption), general health, and psychosocial factors. High prevalence in asymptomatic population: Some of the proposed risk factors for low back pain may be common in people without any symptoms, which complicates the understanding of their role in causing the condition.[7]

Low back pain is a broad topic with many potential etiologies that are divided into five categories. This category of back pain is most commonly caused by injuries to the spine, intervertebral discs, or soft tissues. Examples include fractures, spondylolisthesis, lumbago (acute back pain or strain to muscles like quadratuslumborum or para-spinal muscles), and disc herniation. Pregnancy can also lead to mechanical back pain. Back pain in this category is associated with degenerative changes in the spine. Osteoarthritis of the spine can affect facet joints, sacroiliac joints, and lead to conditions like spinal stenosis and degenerative disc disease. Osteoporotic compressive fractures are also considered part of the degenerative process. Inflammatory: Inflammatory causes of back pain are related to conditions such as seronegative spondyloarthropathies, with ankylosing spondylitis being a prominent example. Sacroiliitis is commonly observed. The pain in these cases is often part of an acute inflammatory process.[8]

OPERATIONAL DEFINITION

Low back pain (LBP): Low back pain (LBP) is one of the most prevalent musculoskeletal disorders that affect the well beingof many individuals.[15] Chronic low back pain, defined as individuals who experience pain between the 12th rib and inferior gluteal folds for at least 12 weeks, is a global health problem causing suffering, disability and work absenteeism.[9]

Core stabilization exercise (CSE): Core stabilization Exercise is a popular option in restoring function of trunk muscles to achieve optimal lumbar stability during daily activities. CSE includes training aimed at re-educating deep

trunk muscles functions, and coordination of deep and superficial trunk muscles in static, dynamic, and functional tasks.[10]

Proprioceptive neuromuscular facilitation [PNF]: training is known to improve proprioceptive function within muscles and tendons of the lumar region thereby increasing trunk muscle activity and coordination in response to neuromuscular stimuli.[11]

McKenzie exercise: the Mckenzie method is a type of physical therapy and exercise that centralized pain, and then focuses on self-healing techniques, including exercise.

AIM OF THE STUDY

To compare the effectiveness of the PNF stretching and Core stabilisation control exercise versus McKenzie exercises in low back pain patients.

PURPOSE OF THE STUDY

The purpose of the study is to improve the effect of treatment with pnf stretching and core stabilization control exercise than compared to McKenzie exercises for improving the low back pain.

HYPOTHESIS

Experimental Hypothesis

There will be significant difference in the effect of PNF stretching and core stabilization control exercise Versus Mckenzie exercises in patients with low back pain.

Null Hypothesis

There will be no significant difference in the effect of PNF stretching and core stabilization control exercise versus McKenzie exercise in patients with low back pain

REVIEW OF LITERATURE

Manjumalaroy, Dr Deepak Anap (Dec 2015) conducted a study on effectiveness of mckenzie with Core muscle stabilization exercises versus Mckenzie with brunkow"s cause exercises in lumbar disc herniation: A pilot study He concluded that the comparing both groups mackenzie with core muscle stabilization exercises is slightly more effective than mackenzie with brounkow"s exercises. But no significant difference was found in theseTwo groups post and follow up values. Due to pilot study and small sample size result cannot be journal arised. but the main study result can be justified.[12]

Z acharysmrcina et al. (2022) int j sports physther conducted a study on A Systematic Review of the Effectiveness of Core Stability Exercises in Patients with Non-Specific Low Back Pain. hereveled that Grade B evidence suggests core stabilization exercises can be considered a favorable method for treating pain in patients with NSLBP.[13]

Aminu A. Ibrahim, Mukadas O. Akindele, et al. (2018) motor control exercise and patient education program for low resource rural community dwelling adults with Chronic Low back pain: A pilot randomized clinical trial it was concluded that the designed interventions are promising and conducting a full scale randomized clinical trial in the future is feasible to confirm the effectiveness of the interventions for the management CLBP in rural Nigeria.[14]

Abhijitdutta et al. (2015) conducted a study on a comparative study to find out the effectiveness between core stabilization versus mckenzie exercises in the treatment of patients with mechanical low back pain. He conducted that the Core stabilization exercises proved to be more effective than the McKenzie exercises in reducing pain and increasing the endurance level in the treatment of patients with mechanical low back pain.[15]

Kumar Neeraj & Verma Shiv (2016). To Compare the Effect of Strengthening Neck Exercise and Mckenzie Neck. The subject will be asked to lie down in a supine position and the shoulder is placed in the neutral position. The hot pack (standard size which hadbeen stored in a hydro-collator tank of 74.5-80 °C). Moist heat pack will be wrapped in towel withthree to four folds over the affected shoulder. Thepack was left in place for 10 to 15 minutes (Kumar Neeraj, et al. 2016).[16]

Niranjan Kumar, et al (2018) did study on Effects of Lateral Deviation from Neutral Position on the Perceived Joint Discomfort Rating in Cervical and Lumbar Region in Sitting and Standing Position. A total of forty subjects were selected based upon

the inclusion and exclusion criteria. Based on the finding of this study we can conclude that lateral bending of the cervical appears to cause more discomfort than the flexion, extension and rotation when performed in the standing position as compared to sitting. Similarly, lateral bending of the lumbar spine appears tocause more discomfort than any other static joint posture, when performed in standing position as compared to sitting. Limitation of the Study: 1. Small sample size. 2. Perceived joint discomfort scale is a subjective scale and its accuracy depends on the level of understanding of subject. 3. No blinding was done. 4. Lumbar extension in sitting position wasnot included in the study. 5. Lumbar rotation ROM was not measured. [17]

Jyoti Sharma, Niraj Kumar et al (2018) did study on effectiveness of Core Strengthening Exercise and McKenzie Extension Exercise on the Pain Functional Disability inlumbar PIVD Condition. The present study showed that McKenzie extension exercise protocol was very much effectivein low back pain with Prolapsed Lumabar Intervertebral disc Condition. As a treatment intervention it is efficient in relieving pain and functional disability. McKenzie extension exercise helps shifting the disc in opposite side of derangement thus reducing the disc prolapsed whereas core stabilization exercise helps strengthening the surrounding muscle thus improving the stability, here my result significantly shows more effective result in McKenzie treatment to reduce pain & improve functional disability.[18]

Manmeet K Dhaliwal et al. (2014) Conducted a study on To Compare The Effect of Proprioceptive Neuromuscular Facilitation Program Versus Core Stabilization Exercises For Decreasing Pain And Improving Functions In Patients With Low Back Pain. He concluded that present study is that the patients of low back pain within the age group of 30-50years are benefited more by Proprioceptive neuromuscular facilitation program rather by Core stabilization exercises.[19]

METHODOLOGY

In this study simple random sampling technique was used and 30 patients were divided into two groups. 15 patients were selected randomly and was included in group A and 15 patients in group B. These subjects were solicited from the Shri Mahant Indiresh Hospital, Departmentof Physiotherapy, Patel Nagar, Dehradun (Uttarakhand) and selected according to inclusionand exclusion criteria. **Inclusion criteria:** Both males and females, Age group of 30-40 years and patients with diagnosed known specific low back pain > three months and **Exclusion criteria:** Neurological disorder, past history of fracture or injury and abdominal and spinal surgery, Osteoarthritis, non cooperative and psychiatric subject and pregnancy. 30 patients of age between 30-40 yrs with low back pain who was willing to take treatment for 6 weeks session after a written consent were taken according to inclusion and exclusion criteria. 15 patients were included in the group first and 15 in the second.The duration of the study was 6 weeks. **Outcome Measures:** VAS [Visual analogue scale] and Schober test. **Independent variables:** PNF Stretching, Core stabilization control, McKenzie exercise. **Dependent variables:** Pain, Range of measure. **Material Used:** Goniometer, Assessment sheet, Consent form, Measuring tape, Pillow, Mat, Examination table, Paper and pen & Visual analogue scale (VAS), (Fig. 1).

Comparative All the participants were explained about the purpose of study the subjects.

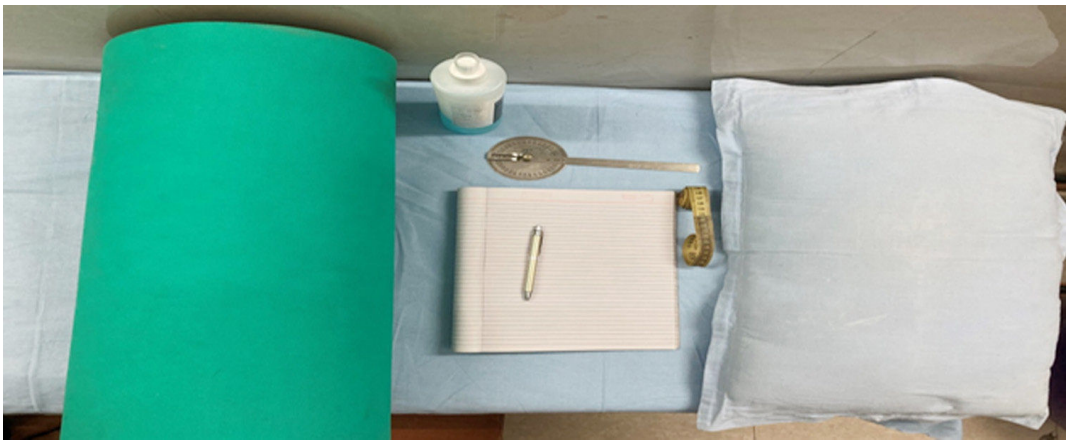

Fig. 1: Image of material

PROCEDURE

Study design

Were screened for inclusion and exclusion criteria and then the baseline measurement was taken. An informed consent was taken from patients who were willing to participate in the study. Eligible subjects were randomly allocated into two groups. Group A participants receiving the pnf technique and core stabilizing exercise. group B participants receiving mckenzie Technique. Both groups had received exercise program for low back pain. The study was of 6 week, 6 days per week at department of physiotherapy in SMIH.

Subjects who fill the inclusion & exclusion criteria will be randomly allotted using chip method Assessment will be taken prior to the treatment & after the treatment.

Schober's test,visual analog score (VAS) are outcome measure

Group A and B has 15 subjects each

GROUP A

The PNF Technique and Core Stabilizing Exercise

The PNF technique performed on the trunk movement. The patient is in sitting position. First, physiotherapist conducted Rhythmic Stabilisation (RS). The RS exercise consisted of alternating (trunk flexion extension) isometric contractions against resistance for 10 seconds, with no motion intended. Subjects performed three sets of 10 repetitions at maximal resistance provided by the same physiotherapist. The resting intervals of 30 seconds and 60 seconds provided after the completion of 10 repetitions for each pattern and between sets, respectively. Secondly, physiotherapist conducted combination of isotonic technique with flexion or extension for lumbar, depending on the patient condition.

The combination isotonic (COI) technique consists of alternating concentric and eccentric contractions of agonists without relaxation. The sequence of COI are resisted active concentric contraction for 5 seconds, resisted eccentric contraction for 5 seconds, and resisted maintained during contraction for 5 seconds (trunk flexion-extension). The combination of isotonic performed three set of 10 repetitions with resting intervals of 30 second and 60 second were provided after completion of 10 repetitions for each pattern and between sets, respectively. In total, all PNF exercise will be held for 30-45 minutes (Fig. 2).



Fig. 2: PNF (Supine Spinal Rotation)(Hold-Relax)

Basic core exercises

Isolate core muscle in different positions

- Transversusabdominus (advance if able to perform 30 reps with 8 sec hold)
  a. Abdominal bracing
  b. Bracing with heel slides

c. Bracing with leg lifts

d. Bracing with bridging

e. Bracing in standing

f. Bracing with standing row

g. Bracing with walking

- Paraspinals/multifidi (advance if able to perform 30 reps with 8sec hold)

Quadruped arm lifts with bracing

Quadruped leg lifts with bracing

Quadruped alternate arm and legs lifts with bracing

Quadratuslumborum and obliques (advance if able to perform 30 reps with 8sec hold)

- **Planks**

Side plank with knees flexed

Side plank with knees extended

- **Trunk curl**
- Physioball
- Functional training positions with activation of core
- Build endurance (Fig. 3 & 4)



Fig. 3: Core Stabilizing Exercise [Planks]



Fig. 4: Trunk Curl Exercise

GROUP B

McKenzie Technique

The subjects in the group B received the McKenzie method. The physiotherapist guided the subject to conduct four extension exercises and three flexion exercises.

The extension exercise started with; first, lying face down for one until two minutes. Second, lying face down with extension, the subject was asked to start with lying face down position and followed with the extension of the trunk on the elbow and

hold on for five seconds and back to first position as a relaxation.Third, extension on lying, subject instructed to start in lying face down position, and then followed with the extension of the trunk with elbow extension (push-up position) for ten seconds, then the subject asked to relaxation with back to first position (Fig. 5).



Fig. 5: Mckenzie Technique (Spinal Extension) (Prone On Hand)

Fourth, extension on standing, subject instructed to standing and then asked to do the extension of the trunk and hold for five seconds with hands of the back and the fingers pointing backwards and then followed with relaxation with back to standing position.

All extension exercise repeated for ten repetitions for two sets.The flexion exercise started with; first, flexion on lying, subject was instructed on lying position then flexes the trunk with both knees to the chest and hold with both hands.

Subjects instructed to hold that position for five second and relaxation to the first lying position. Second, flexion on sitting, the subject asked to sit on the edge of a chair, and then instructed to bend the trunk forward and grasp the ankle or touch the floor with both hands. This position maintained for five seconds and followed with relaxation to the first position.

Third, flexion on standing, the subject was asked to be in standing position, and then was instructed to bend forward or flexion the trunk with fingers down to the legs as far as they can. Subject asked to hold the last position for five seconds and back to standing position as a relaxation. All flexion exercises were also repeated for ten repetitions for two sets. There are three minutes for resting intervals in every set. The McKenzie treatment lasted for 20-40 minutes (Fig. 6).



Fig. 6: Mckenzie Technique (Spinal Extension In Standing)

DATA ANALYSIS

This chapter deals with the statistical analysis of 2 outcome measures that is VAS and Schober test between group A and group B. The data was analysed by using the statically software SPSS 15 version. To analyse the difference of VAS and schober test of Group-A (PNF stretching and core stabilization exercise) AND Group B (Mckenzie technique) unpaired t-test used to compare pre and post treatment scores of VAS and Schober test within the group A and group B. Unpaired t-test used to compare post treatment scores of VAS and schober test between Group A and Group B. Outcome measures of all individual were analyzed on day one, before the start of the therapy and at the end of 6 weeks. Comparison between pre and post treatment of group A and group B was done.

RESULT

This chapter deals with the result of data analysis of two outcome measures that is with VAS and SCHOBER TEST, within group A and group B and between group A and group B. The score was analyzed and interpreted to determine which intervention is more effective insubject with low back pain.

UPNnpaired t-test was used to analyze and compared pre and post treatment score within the group A and group B. Analyzing VAS revealed significant difference in group A post treatment, mean and standard error of mean (6.13+0.322) when compared to group A pre-treatment, Mean and standard error of mean (7.67+0.333) Analyzing SCHOBER TEST revealed significant difference in group A post treatment, mean and standard error of mean (2.9600+0.150) when compared with group A pre treatment, mean and standard mean (2.0467+0.167) (table 6.1)

Table 6.1: Within group comparison of pre and post data of both outcome measure in Group A

Low Back Pain Measured By	Pre (mean + SEM)	Pre (mean + SD)	Post (mean + SEM)	Post (mean + SD)	t-Value	P-Value
VAS	7.67+0.333	7.67+1.291	6.13+0.322	6.13+1.246	3.310	0.0026
Schober Test	2.0467+0.167	2.0467+0.64682	2.9600+0.150	2.9600+0.58162	4.067	0.0004

Analyzing VAS revealed slightly significant difference in group B post treatment, mean and standard error of mean (4.20+0.262) when compared to group B pre-treatment, Mean and standard error of mean (7.73 +0.267)

Analyzing SCHOBER TEST revealed slight significant difference in group B post treatment, mean and standard error of mean (4.2600+0.123) when compared with group B pre-treatment, mean and standard mean (2.5733+0.214) (table 6.2)

Table 6.2: Within group comparison of pre and post data of both outcome measure in Group B

Low Back Pain Measured By	Pre (mean + SEM)	Pre (mean + SD)	Post (mean + SEM)	Post (mean + SD)	t-Value	P-Value
VAS	7.73+0.267	7.73+1.033	4.20+0.262	4.20+1.014	9.454	<0.0001
Schober Test	2.5733+0.214	2.5733+0.830	4.2600+2.57	4.2600+0.4777	6.820	<0.0001

The data were analysed using the statistical software SPSS 15 version. To analyse the difference of VAS and SCHOBER TEST of Group-A (PNF stretching and core stabilization) and Group-B (McKenzie technique) the unpaired t-test was applied.

As comparing the mean difference between both the groups, the mean difference in VAS for Group-A is 1.54 and Group-B is 3.53 this result showed that Group-B is more effective in VAS as compared to Group-A. On the other hand, while comparing the mean difference between both the Group A and Group-B in SCHOBER TEST, Group-A showed 0.9133 and Group-B showed 1.686 that indicated that the Group-B is more effective in SCHOBER TEST than Group-A. (Table 6.3)

Table 6.3: Mean difference in VAS and SCHOBER TEST in between Group A and Group B

	Group A (PNF stretching and Core Stabilization)		Group B (Mckenzie Technique)	
	VAS	SCHOBER TEST	VAS	SCHOBER TEST
Mean difference	-1.54	0.9133	-3.53	1.686
SD	-0.045	-0.0652	-0.019	-0.3525
t value	3.310	4.067	9.454	6.820
P value	0.0026	0.0004	<0.0001	<0.0001

Therefore, result suggest that after 6 week of PNF stretching and Core stabilisation control exercise and mckenzie technique both groups shows improvement in Low back pain but mckenzie technique shows more improvement.

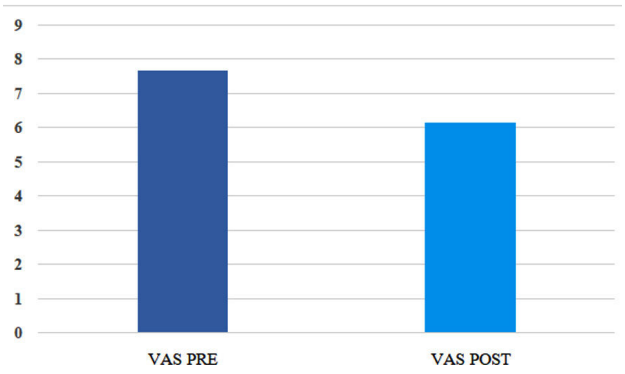

Fig. 6.1: Mean of Group A (VAS)

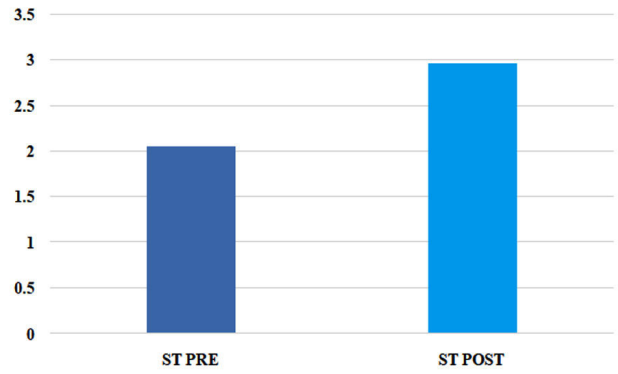

Fig. 6.2: Mean of Group A (SCHOBER TEST)

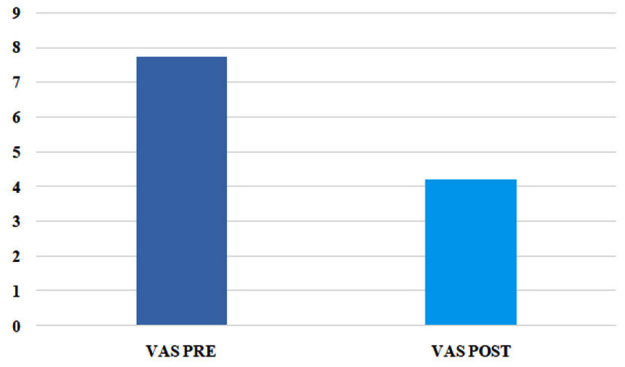

Fig. 6.3: Mean of Group A (SCHOBER TEST)

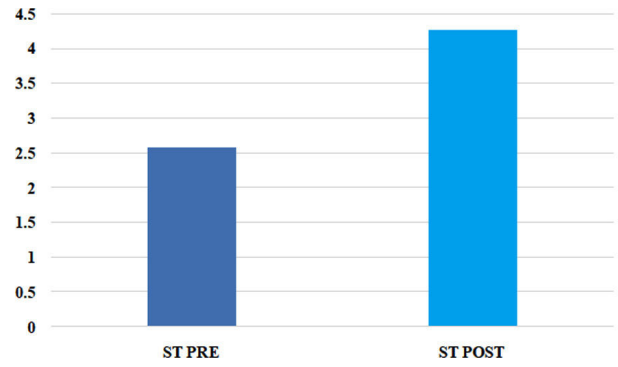

Fig. 6.4: Mean of Group B (SCHOBER TEST)

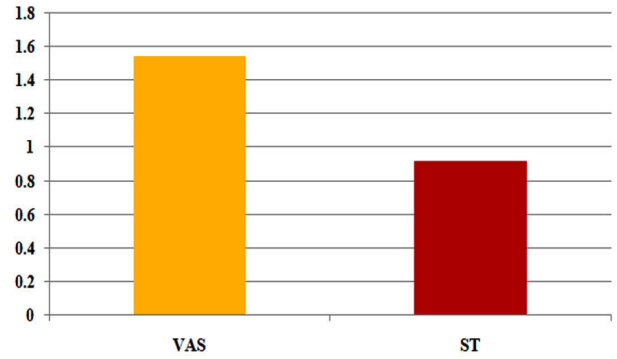

Fig. 6.5: Mean difference of Group A

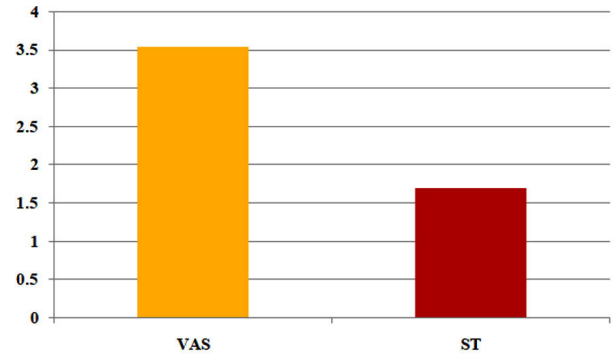

Fig. 6.6: Mean difference of Group B

DISCUSSION

Low back pain has emerged as a critical issue of concern, transcending its status as a mere medical condition. Its impact resonates across the spheres of public health, social dynamics, and economic stability, weaving a complex web of challenges. Rooted in a myriad of potential causes, low back pain is a disorder that knows no bounds, affecting various demographic groups with differing etiologies.

Among these groups, it assumes a prominent role within the working population, where a staggering 35% grapple with the burden of chronic back pain. This persistent discomfort is far from trivial, casting a shadow over everyday life and significantly impeding routine activities. (suryapani, 1996)

Result of the present study concluded that both the PNF stretching with core stabilizing control exercise and McKenzie technique were effective for low back pain. However, statistically it was concluded that the McKenzie technique is more effective than the PNF stretching with core stabilizing control exercise. There was statistically significant in reducing pain and increasing ROM for Group B that was treated by McKenzie technique as compared to those who received PNF stretching with core stabilizing control exercise for Group A.

The group A subject were allowed to perform PNF stretching with core stabilizing control exercise and group B performed McKenzie technique at the end of 6 weeks there was a significant change in VAS and Schober test score in McKenzie technique between pre and post. There was a significant improvement in Group B (McKenzie technique) compared to Group A (PNF stretching with core stabilizing control exercise.

Comparison of pre and post VAS and schober score with in two groups showed that in both the groups there was significant improvement between pre and post mean score .there was a significant improvement in Group B compared to Group A.

Group A shows non-significant results. In this group PNF stretching with core stabilizing control exercise was given to patient and shows non-significant results after 6 weeks when compared to pre intervention scores. This states that PNF stretching with core stabilizing control exercise in the form of active and active assisted exercise are not sufficient for speedy and significant out comes. This result also place stress on proper treatment protocol with proper treatment modalities for patient for expected outcome hence proving experimental hypothesis.

Group B shows significant change in post intervention which approves increase ROM and decrease in pain according to VAS and Schober test. This study applied McKenzie technique in low back pain. This could include improvements in ROM and decreasing pain.

The result signify the positive effect of Mckenzie technique in subject with low back pain, in addition to the positive effects on centralizing the pain and increasing ROM in low back pain patients. generally Physical therapy promotes patient involvement, individualized care, and the development of self-management strategies. Through targeted exercises, education, and movement analysis, physiotherapists help patients alleviate pain, improve function, and enhance their overall quality of life.

This study relevant to the present study which showed significant decrease in pain with McKenzie technique. The primary goal of this study was to study the effects of PNF stretching with core stabilizing control exercise in comparison to McKenzie technique in patient with low back pain.

After statistical analysis, it showed that Both groups are capable of reducing low back pain, But the Mckenzie technique shows greater capability in reducing low back pain.

Limitation of the Study

The sample size was small which should be reversed to a large number of subjects and for a longer duration of period.

This was short term study of six week and no further follow up of subjects was carried out.

Home program was not taught to subjects.

Study was done on patients of low back pain.

Future Reserch

Study can be done on wide sample. Study can be done on different subject and different groups. Study can be done on beginner patients. Advanced methods could be used. Further Studies are recommended to minimize this limitation in such a way that larger sample size of both sexes that include various age groups of people are studied. The duration of the study can be increased. Various outcome measures can be used in order to record functional independence in better way. The study can be done to improve low back functions.

CONCLUSION

PNF Stretching with core stabilization control exercise and mckenzie technique both shows improvement in low back pain but Mckenzie technique shows more improvement in centralizing the pain and ROM in low back pain after 6 weeks of therapy.

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