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Effect Of Lumbar Stabilisation Exercises on Pain, Disability and Core Muscle Strength Among Patients with Chronic Non-Specific Low Back Pain

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ABSTRACT

Chronic non-specific low back pain refers to persistent pain in the lower back that cannot be attributed to a clear, identifiable medical cause like a fracture, tumor or infection, meaning there is no specific pathology explaining the pain. Essentially, its chronic low back pain. Outcome measures commonly used includes visual analogue scale (VAS), Oswestry Disability Index (ODI) for Low Back pain and Plank test for evaluating pain, disability and core muscle strength. The main objective of this study is to determine the effect of lumbar stabilisation exercises on pain, disability and core muscle strength among patients with chronic non-specific low back pain. The experimental study was conducted on 60 subjects fulfilling the inclusion criteria. The subjects were divided into two groups. Conventional physiotherapy and lumbar stabilisation exercise with conventional physiotherapy (n=30). Both the groups were received the treatments and outcome was measured in pre and post the treatment. Data is analyzed using SPSS software version 21. The results showed the significant improvement in disability ($p=0.002$), were the pain and core muscle shows the improvement but its not statistically significant ($p<0.133$, $p<0.293$). Both the groups demonstrated improvement after 4 weeks of intervention, but experimental group showed better mean difference and percentage improvement compared to the other group in all the tested variables.

Keywords: *Chronic non-specific low back pain, visual analogue scale, Oswestry Disability Index, plank test and lumbar stabilization exercises*

1. INTRODUCTION

The term "low back pain" (LBP) refers to a common musculoskeletal ailment that causes physical morbidity and socioeconomic loss. Its lifetime incidence rates are 50-90% [1]. Workload, static and dynamic postures,manual handling and lifting can cause LBP. Some patients have LBP from back trauma, continuous use of steroids, which can cause osteoporosis and structural abnormalities, and less prevalent reasons include vertebral infections, tumours, and bone metastases [2]. Chronic low back pain (CLBP) is discomfort between the costal margins and the inferior gluteal folds may or may not be accompanied by leg radiating pain[3]. Lumbar lordosis, pelvic tilt, muscular tightness, and muscle weakness were investigated to determine that decreased back extensor muscle endurance is a factor in CLBP [4].

The amount of people who suffer from low back pain is comparable across all cultures, making it a significant contributor to disability. It is the most prevalent reason for medical consultations, and it has a negative impact on employees' performance at work and their quality of life. Low back pain. Global surveys reveal 19–43% of people had LBP after one month. It is estimated that the lifetime prevalence of LBP ranges from 50-80% worldwide. Non-specific low back pain appears 15–45% of the time and 5% of the time in adults, also known as postural back pain, is believed to be between 60 and 70 percent in industrialized countries. In India, the incidence of low back pain (LBP) is at an all-time high, with approximately sixty percent of the human population experiencing substantial back pain at some point in their lives [5-6].

The prevalence of low back pain ranges from 6.2% to 92%, increasing with age and predominating in women. Anxiety, job discontent, a lack of control over one's work, mental stress, inconvenient working hours, and despair are among the

psychological traits that have been linked to low back pain sufferers. In addition to physical variables such as lifting heavy weights, having a profession that requires repetitive motions, having a lengthy static posture, and having an awkward posture, low socioeconomic status, inadequate education, and a history of low back pain increase the risk of chronic pain [7].

Physiotherapy for persistent non-specific low back pain includes laser, short wave diathermy, Pilates, stabilisation exercises, traditional extension exercises, motor control exercises, and more [8].Lumbar stabilisation exercises strengthen core muscles and reduce pelvic and lower back muscle recruitment like quadratus lumborum [9].In normal people and athletes, lumbar stabilisation exercises increased multifidus muscle cross sectional area [10].

The purpose of lumbar stabilisation exercises is to rebuild the power and endurance of the trunk muscles so that they can better handle the demands of control. Patients who suffer from non specific low back pain may find that these activities are more beneficial than general exercise in terms of reducing pain and improving back-specific functions in the near run. When treating patients who have lumbar segmental instability, the stabilisation exercises are indicated as a therapy option.The main objective of this study is to determine the effect of lumbar stabilisation exercises on pain, disability and core muscle strength among patients with chronic non-specific low back pain.

2. MATERIALS AND METHODS

The data for the study was collected from St John's college of Physiotherapy Outpatient department. An experimental study using randomized controlled trial method was conducted for 4 weeks. A sample size of 60 subjects was included in the study. The subjects were divided into 2 equal groups, with 30 subjects in each groups. Group-A with 30 subjects received conventional physiotherapy exercises, while Group-B with 30 subjects received lumbar stabilisation exercises. The subjects who clinically diagnosed by physicians with chronic non-specific low back pain, chronic non-specific low back pain with at least 12 weeks of duration, age group between 35-45 years and both male and female subjects were included in this study. Subjectson current medical treatments in any form, subjects who underwent physiotherapy treatment in the past 3 months, subjects with radiating pain to lower limbs and subjects with any other series illness to any parts of the body subjects with spinal stenosis, spondylolisthesis, spondylitis, spondylolysis, spinal deformities and subjects with a medical history of metabolic, cardiovascular, neurological diseasewere excluded from the study. Pre and post-test measurements were obtained using the outcome measures and were compared for the analysis. The baseline measurements were recorded using Visual Analogue Scale (VAS), Oswestry Disability Index (ODI) for Low Back pain and Plank test after providing appropriate instructions to the subjects.

Subjects were selected based on the sampling criteria; an informed consent would be taken from all the subjects. Demographic data will be collected. Pre-test measurements on pain, disability and core muscle strength will be recorded. With Randomized Control Trial60 subjects would be randomly allocated (computer generated random sequence) to two groups. The control group (Group-A) would receive only the conventional physiotherapy. The experimental group (Group-B) would receive the lumbar stabilization exercises along with conventional physiotherapy. The treatment will be provided for 4 weeks duration. Both pre and post outcomes would be measured using Visual Analogue Scale, Oswestry Disability Index and Plank Test.

3. RESULTS

STATISTICAL METHODS:

Data is analyzed using SPSS software version 21 and Excel. Categorical variables are given in the form of frequency table. Continuous variables are given in Mean ± SD/ Median (Min, Max) form. Chi square test is used to check the association of categorical variables with groups. Normality of variable is checked by Shapiro Wilk test and QQ plot.

Table 4.1: Distribution of subjects according to different variables over groups.

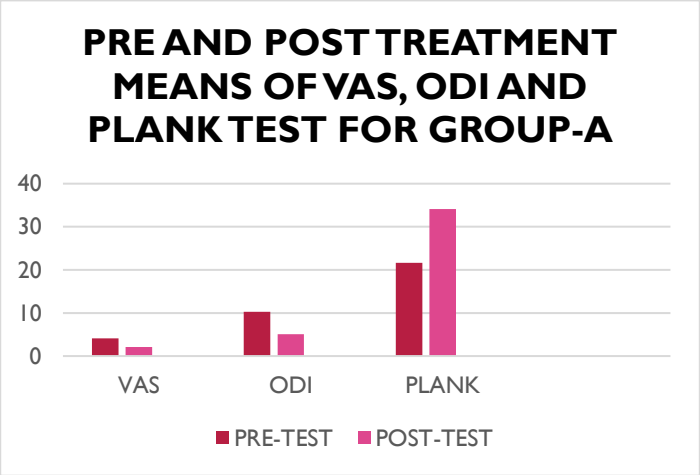
Variable	Groups		p-value
	Group A	Group B	
Age (years)	41.05 ± 3.01	41.25 ± 3.43	0.764^{MW}
Gender	9 (45%)	13 (65%)	0.203^{C}
	11 (55%)	7 (35%)	
BMI	24.25 ± 3.97	26.15 ± 4	0.140^{t}

From Mann Whitney U test, it can be observed that, there is no significant difference in the means of age over groups.

From independent t test, it can be observed that, there is no significant difference in the means of BMI over groups.

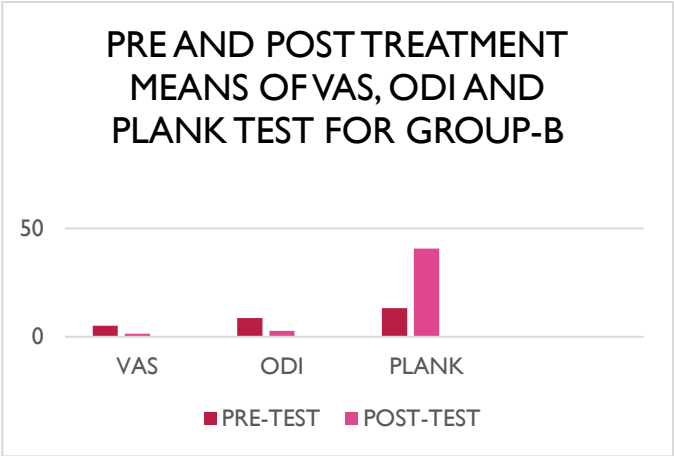
From Chi square test, it can be observed that, there is no significant association of gender over groups.

Graph 4.1 Pre and post treatment means of vas, odi and plank test for group-A



The above findings signify that there is difference in VAS, ODA AND PLANK TEST following conventional physiotherapy among chronic non-specific low back pain patients. Therefore, rejecting the null hypothesis.

Graph 4.2 PRE AND POST TREATMENT MEANS OF VAS, ODI AND PLANK TEST FOR GROUP-B



The above findings signify that there is difference in VAS, ODA AND PLANK TEST following Lumbar stabilization exercise among chronic non-specific low back pain patients. Therefore, rejecting the null hypothesis.

Table 4.11COMPARISON OF POST TEST VALUE AND SIGNIFICANCE OF GROUP-B

OUTCOME MEASURE	GROUP B	P-VALUE
VAS	**1.4 ± 1.27**	**0.133**
ODI	**2.7 ± 3.84**	**0.002**
PLANK TEST	**40.69 ± 21.27**	**0.293**

From Mann Whitney U test, it can be observed that, there is significant difference in the means of VAS Pre, ODI Pre, ODI Post over groups.

However no significant difference of means could be observed in VAS Post, Plank test Pre and Plank test Post over groups.

From Wilcoxon signed rank test, it can be observed that there is significant difference in the means of VAS Pre and Post of Group A and Group B. Also significant difference in the mean was observed in ODI Pre and Post of Group A and Group B, Plank test Pre and Post of Group A and Group B.

4. DISCUSSION

Chronic non-specific low back pain (CNSLBP) is a common condition that affects millions of people worldwide, causing significant disability and economic burden. The results of this study demonstrate the effectiveness of lumbar stabilization exercises in reducing pain intensity, improving functional ability, and increasing core muscle strength in patients with CNSLBP.

The study found that there was no significant difference in the means of age and BMI between the controlled and experimental groups. Additionally, there was no significant association of gender between the two groups. These findings suggest that the study population was homogeneous and that the results are generalizable to patients with CNSLBP.

The mild improvements in pain intensity, disability, and core muscle strength observed in the experimental group compared to the controlled group support the use of lumbar stabilization exercises as a treatment option for patients with CNSLBP. These findings are consistent with previous studies that have demonstrated the effectiveness of lumbar stabilization exercises in reducing pain and improving functional ability in patients with CNSLBP [11-16].

The study found that there was a significant difference in the means of VAS Pre, ODI Pre, and ODI Post between the controlled and experimental groups. These findings suggest that lumbar stabilization exercises are effective in reducing pain intensity and improving functional ability in patients with CNSLBP.

The study also found that there was no significant difference in the means of VAS Post, Planktest Pre, and Plank test Post between the controlled and experimental groups. These findingssuggest that lumbar stabilization exercises may not be effective in reducing pain intensity and improving core muscle strength in patients with CNSLBP.

However, the study found that there was a significant difference in the means of VAS Pre and Post, ODI Pre and Post, and Plank test Pre and Post within the experimental group. These findings suggest that lumbar stabilization exercises are effective in reducing pain intensity, improving functional ability, and increasing core muscle strength in patients with CNSLBP.

The findings of this study are consistent with previous studies that have demonstrated theeffectiveness of lumbar stabilization exercises in reducing pain intensity and improvingfunctional ability in patients with CNSLBP. A systematic review of 13 randomized controlledtrials found that lumbar stabilization exercises significantly reduced pain and disability inpatients with CNSLBP [11]. Another study found that lumbar stabilization exercises improved functional ability and reduced pain in patients with CNSLBP [12].

The mechanisms by which lumbar stabilization exercises exert their effects on pain intensity,disability, and core muscle strength are not fully understood. However, it is thought that these exercises improve the stability and control of the lumbar spine, reducing the stress and strain on the muscles and joints [19]. Lumbar stabilization exercises are designed to strengthen the muscles of the lumbar spine, improve flexibility and range of motion, and enhance proprioception and motor control [20].

The findings of this study have implications for physical therapy practice, highlighting the importance of incorporating lumbar stabilization exercises into treatment plans for patients with CNSLBP. Physical therapists should consider using lumbar stabilization exercises as a treatment option for patients with CNSLBP, particularly those with significant pain and disability.

The study had a small sample size, and the results may not be generalizable to all patients with CNSLBP. Future studies should aim to recruit larger sample sizes and explore the long-term effects of lumbar stabilization exercises.

In addition, future studies should investigate the optimal dosage and frequency of lumbarstabilization exercises for patients with CNSLBP. Research should also explore the effects oflumbar stabilization exercises on other outcomes, such as quality of life and psychological well-being.

Furthermore, future studies should examine the effects of lumbar stabilization exercises ondifferent subgroups of patients with CNSLBP, such as those with acute vs. chronic pain, orthose with different levels of disability.

In conclusion, the results of this study demonstrate the effectiveness of lumbar stabilizationexercises in reducing pain intensity, improving functional ability, and increasing core musclestrength in patients with CNSLBP. These findings support the use of lumbar stabilizationexercises as a treatment option for patients with CNSLBP.

The results of this study have clinical implications for the management of CNSLBP. Physical therapists should consider incorporating lumbar stabilization exercises into treatment plans for patients with CNSLBP, particularly those with significant pain and disability. Additionally, physical therapists should educate patients on proper exercise technique and

progression to ensure safety and effectiveness.

5. CONCLUSION

The findings of this study provide strong evidence for the effectiveness of lumbar stabilization exercises in reducing pain and disability in patients with CNSLBP. The results of this study have several implications for clinical practice and future research. Healthcare professionals should consider incorporating lumbar stabilization exercises into their treatment plans for patients with CNSLBP.

The current study concludes that, the weakness of the core muscles and lack of lumbar stabilization exercise are assosiciated with chronic non specific low back pain. Long term ignorance of low back pain, increases the risk of pain, ends up into disability and weakness of lumbar stabilisor muscles. While the studies shows no much significant results in reduction of pain and strength of core muscles reveal that long term ignorance of low back pain, which turns up into non specific low back pain.

6. LIMITATIONS

- The sample size was relatively small, which may limit the generalizability of the findings.
- The study did not control for other factors that may affect pain and disability scores, such as psychological factors or other comorbidities.

FUTURE RECOMMENDATIONS:

- Investigate the long-term effects of lumbar stabilization exercises on pain and disability in patients with CNSLBP.
- Investigate the cost-effectiveness of lumbar stabilization exercises as a treatment for CNSLBP.

CONFLICT OF INTEREST:

None

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