

## Effectiveness of Core Muscle Stabilization Exercises with and without Lumbar Stretching in Non-Specific Low Back Pain

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### Abstract

**Background:** Chronic low back pain (CLBP) is the pain that lasts for more than 12 weeks. The causes of low back pain are; the decrease strength of superficial trunk and abdominal musculature, insufficient motor control of the deep trunk muscles. The management strategies are the use of reassurance, recommendations to be active, brief awareness, analgesics, non-steroidal anti-inflammatory drugs, spinal manipulation therapy, muscle relaxants and weak opioids. In chronic cases exercise therapy have important documented role.

**Objectives:** To determine the effectiveness of core muscle stabilization exercises with and without lumbar stretching exercises in non-specific low back pain patients.

**Methods:** This was a quasi-experimental study. Subjects with non specific low back pain fulfilling the predetermined sample selection criteria were divided into two groups randomly. Pre-assessment was done by using numeric pain rating scale (NPRS) and Oswestry low back pain disability questionnaire (OLBPDQ) as subjective measurements while range of motion and muscle strength as objective measurements. Subjects in group one were treated with lumbar muscle stabilization exercises and the other was treated with core muscle stabilization exercises with lumbar stretching. Each subject was given 12 treatment sessions with 2 sessions per week. Post treatment assessment was done after 3rd and 6th week treatment. Readings were analyzed by using Statistical Package for Social Sciences 21.

**Results:** The pain intensity was changed from  $7.77 \pm 1.02$  to  $3.50 \pm 1.185$  for group 1 and  $8.36 \pm 1.136$  to  $0.68 \pm 0.7163$  for group 2. The functional status score also showed more improvement in group 2 from  $28.50 \pm 5.990$  to  $8.45 \pm 2.198$  than group 1.

**Conclusion:** The results proved that core muscle stabilization with lumbar stretching were more effective than core muscle stabilization exercises alone for the management of non-specific low back pain.

**Keywords:** *Non-specific low back pain, core stabilization exercises, lumbar stretching exercises*

### Introduction

Chronic low back pain (CLBP) is defined as the

pain that remains for more than 12 weeks. Back pain is the frequent occurring clinical finding of musculoskeletal region diseases<sup>(1)</sup>. In United States the prevalence of chronic low back pain is more than 50%<sup>(2)</sup> and it is the main reason of occupational risks and disability<sup>(3,4)</sup>. There is no exact finding of low back pain prevalence in Pakistan according to current literature. In developed countries chronic low back pain is one of the major problems related to health. Low back pain has resulted in increased

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medical cost<sup>(5)</sup>. The common ages at which low back pain be reported are late teens, early twenties or adult age.<sup>(6)</sup> The causes of low back pain are complex and most of which are unknown<sup>(7)</sup>. Some important causes are; the decrease strength of superficial trunk and abdominal muscles<sup>(7,8)</sup>, inadequate motor control of multifidus and transversus abdominus<sup>(1)</sup>. The precise categories and the methods of determination vary. The four clinical patterns of low back pain are: mechanical origin, nerve root associated pain, due to some other pathology and psychological cause<sup>(9)</sup>. The trunk musculature provides support and enables for locomotion which is disturbed in low back pain patients<sup>(10)</sup>.

To prevent low back pain it is necessary to provide early intervention<sup>(11)</sup>. The literature based on etiology and pathogenesis of low back pain suggests relationship between exercise and muscle strength<sup>(12,13)</sup>. There are different options of treatment like; physiotherapy, pharmacological treatment, injection therapies, acupuncture and surgical approaches etc.<sup>(14,15)</sup> Conservative exercises utilized for the active contraction of core musculature in physiotherapy management<sup>(16,17)</sup>. The muscles responsible for local stability are multifidus, transversus abdominus and internal oblique while for movements are long erector spinae and rectus abdominus<sup>(18)</sup>. In back muscle rehabilitation protocol, start with muscle setting isometrics and then progress to functional training activities are reported<sup>(19)</sup>. The purpose of study was to compare the effectiveness of core muscle stabilization exercises with and without lumbar stretching in non-specific low back pain as no exact comparative study was found in literature.

## Methods

It was a quasi-experimental study. It was conducted in the outpatient physiotherapy department, Mayo Hospital, Lahore. The study was completed in six months from August 2016 to February 2017. A total of 54 patients were selected for the study, out of which 10 were dropped and 22 patients were selected in each group. Non-probability convenient sampling technique was used for sample collection due to limited time for

data collection. The patients were included in the study having characteristics of chronic low back pain for at least three weeks or twelve weeks, outcomes included were: pain, functional measures, range of motion and muscle strength, age between 20 to 55 years, both genders and exclusion criteria: duplicate reports, age below 20 or after 55 years, any malignancy, any spinal fracture and inflammatory arthritis.

An informed consent was taken from the patient using a consent form. The patients were included in each group by using even odd randomization method. Patients came to physiotherapy department with history of low back pain either referred from orthopedician or by self. The patient was first assessed by physiotherapist before treatment for pain intensity with numeric pain rating scale and functional status with Oswestry low back pain disability questionnaire, lumbar range of motion with tape method and muscle strength with manual muscle testing. The physical assessment was done by straight leg raise test (sensitivity=91% and specificity = 26%)<sup>(20)</sup> and one leg standing test (stork stand) (sensitivity=50%-55%, and specificity = 46%-68%)<sup>(21)</sup>, lumbar mobility test and sacroiliac joint testing. Further assessment was strengthened by radiological measures.

In group 1 patient received core muscle strengthening particularly lumbar muscles isometrics (stabilization exercises) three sets a day for each ten repetitions with 10 second holding and isotonic exercises (concentric type) three sets a day for each ten repetitions targeting transversus abdominis, multifidus and pelvic muscles while in group 2 patient received core musculature strengthening muscles isometrics (stabilization exercises) three sets a day for each ten repetitions with 10 second holding and isotonic exercises (concentric type) three sets a day for each ten repetitions along with lumbar stretching exercises of same muscles with 12 stretches, held for 30 seconds each<sup>(22,23)</sup>. The patients were given two sessions a week for six weeks. The patients were reassessed after 3rd week and 6th week, then followed up for another two

weeks. The change in pain intensity, range of motion and functional status finding was noted. The patients were followed up by phone for checking recurrence of symptoms. A well-constructed questionnaire was used for data collection.

SPSS (statistical package for social sciences) was used for data analysis. Quantitative variables were measured in the form of mean  $\pm$  SD along its range (max-min). Independent sample t-test was used for comparison of mean difference. P-value  $<$  0.05 was taken as significant.

## Results

Out of 44 non-specific low back pain patients 8 were females and 36 males. The age of the patients included in the study range from 18 to 62 years. The onset of pain showed 54.5% sudden and 45.5% gradual symptoms of pain. 50% patients have low back pain due to trauma, 34% due to lifting heavy weight, and remaining due to immobilization and others causes. About 57% patients have duration of pain of less than two weeks.

Base line data of pain intensity was  $7.77 \pm 1.020$  for group 1 and  $8.36 \pm 1.136$  for group 2. The pain intensity for group 1 after six week treatment was changed to  $3.50 \pm 1.185$  and  $0.68 \pm 0.7163$  for group 2 from baseline values. The results showed that more improvement in pain intensity occurred in patients receiving core strength training with lumbar stretching than core strength training alone (Figure. No.1& 2).

Pre-treatment oswestry low back pain disability questionnaire mean score for group 1 was  $23.09 \pm 5.061$  and  $28.50 \pm 5.990$  for group 2 that changed to  $9.35 \pm 3.081$  for group 1 and  $8.45 \pm 2.198$  for group 2.(Figure.No.3).The results of independent sample t-test represented as p-value $<$ 0.05 for

pain intensity before treatment and changed to p=0.00 after application of six week treatment. But p-value in terms of functional status was p=0.235 after six week treatment. The results were summarized in Table. No.1.

**Pain Intensity:** (Numeric pain rating scale score)

Group.1: (figure.1)

**Pain Intensity:** (Numeric pain rating scale score)

Group 2: (Figure.2)

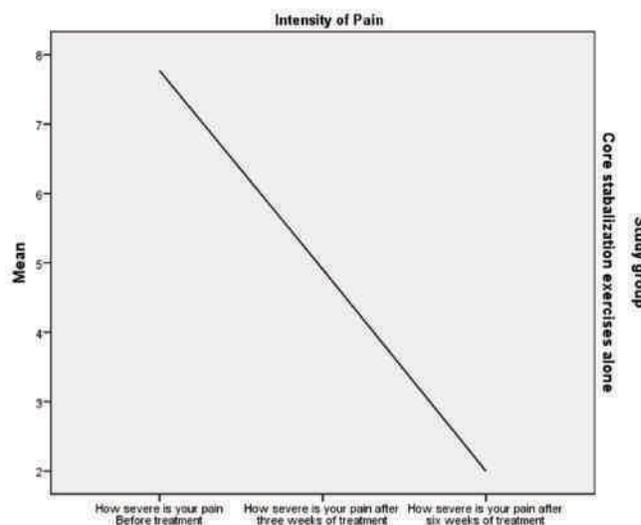
**Functional Status Score:** (Oswestry low back pain disability questionnaire score)

Group.1 and 2: (figure.3)

## Discussion

This study showed more reduction in pain intensity as well as improvement in functional status of low back in group 2 who received core muscle strengthening exercises with lumbar stretching than group 1 received only core muscle strengthening.

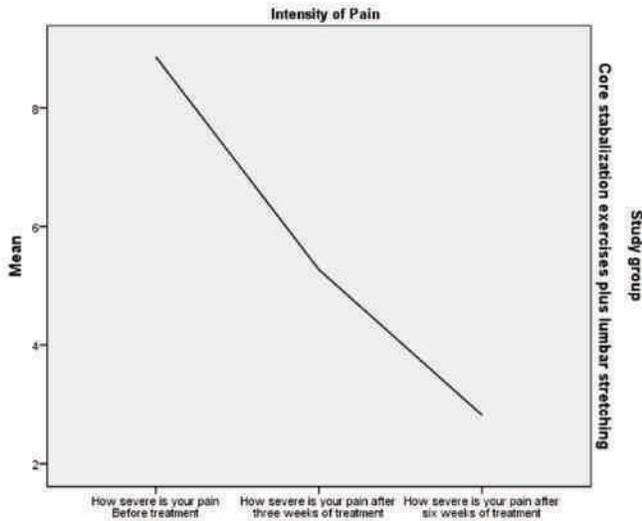
Pain intensity score difference was 4.27 for



**Figure 1:** Numeric Pain Rating Scale Score; Group 1 group 1 and 7.68 for group 2 and it was changed

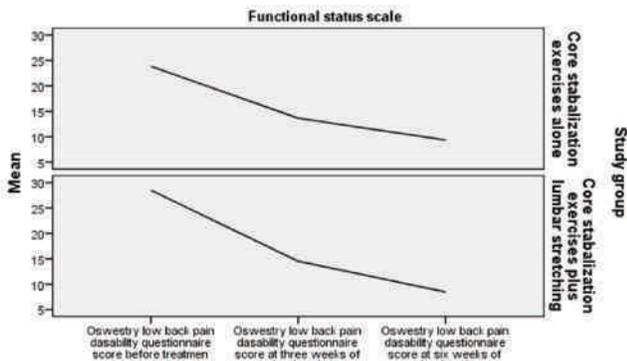
**Table 1:** Comparison between group 1 and group 2:

	Group 1			Group 2			P-value
	Baseline Mean $\pm$ SD	At 3 weeks Mean $\pm$ SD	At 6 weeks Mean $\pm$ SD	Baseline Mean $\pm$ SD	At 3 weeks Mean $\pm$ SD	At 6 weeks Mean $\pm$ SD	
<b>Pain Intensity</b>	7.77 $\pm$ 1.02	5.27 $\pm$ 1.27	3.50 $\pm$ 1.18	8.36 $\pm$ 1.13	4.59 $\pm$ 1.40	0.68 $\pm$ 0.71	0.000
<b>Functional status score</b>	23.09 $\pm$ 5.06	13.55 $\pm$ 3.39	9.36 $\pm$ 2.77	28.50 $\pm$ 5.99	14.50 $\pm$ 5.02	8.45 $\pm$ 2.19	0.235



**Figure2: Intensity of Pain in Study Groups**

from 7.77±1.020 to 3.50±1.185 and 8.36±1.136 to 0.68±0.716 respectively. The pain scores of both groups were comparable. The pain intensity according to visual analogue scale for group A (receiving strengthening exercises) changes from 4.6 to 4.2



**Figure3: Functional Status Scale in Study Groups**

and for group B (receiving stabilization exercises) from 5 to 0.2<sup>(24)</sup>. The difference of mean for functional status of back was 13.73 for group1 and 20.05 for group 2. The mean±SD value for group 1 changed from 23.09±5.061 to 9.36±2.270 and 28.50 ± 5.990 to 8.45±2.198 for group 2 respectively. The Oswestry low back pain disability questionnaire score shows more improvement in group B (receiving stabilization exercises) from 10 to 2 than group A (receiving strengthening exercises) from 19 to 15<sup>(24)</sup>.

All patients with chronic low back pain were received core stabilization exercises on behalf of deconditioning that leads to trunk instability without documented proof from randomized con-

trolled trial yet. Different randomized controlled trials document the benefits of these exercises with more emphasis on local spinal stabilizer muscles<sup>25</sup>.

The findings showed that trunk muscles exercises with lumbar stretching than lumbar muscle strengthening exercises alone reduces the patient self-reported disability more efficiently after the end of a 6-weeks exercise period. In Pakistan no previous study with combination of lumbar stretching exercises along with lumbar strengthening with same intensity and duration has done.

Core strength training program is employed for deep muscles of the trunk. However, separate training program exerts challenging effects for chronic low back pain patients. By reviewing the literature, no one single system is suitable for measuring and distinguishing the outcomes of core strengthening and strength training. So, effective management of chronic low back pain is based on systematically reviewed guidelines. Another difficulty that influences patients and healthy peoples is decrease extensibility of muscles. Muscle stretching causing rapid increase in lengthening of shortened structures.

Data acquired immediately post treatment from both groups. Clinically significant improvement in the group who receive core stabilization exercises along with lumbar stretching. Even upon improvement of muscles activation and flexibility the mechanism of action of stabilization exercise retraining still remains unclear, because it has not been affect mechanically unstable segment. Less chronic low back pain symptoms recurrence 6 weeks after the treatment.

Difficulties were seen in gathering data from female patients. The participants in this study were included solely from the department of physiotherapy, so the results cannot be generalized. Difficulties were faced when establishing a diagnosis of the disease as this disease can be misdiagnosed as conditions other than low back pain.

**Conclusion**

The prognosis of the disease is best in the patients who received lumbar muscles strengthening exercises along with lumbar stretching than group 1 who received lumbar strengthening exer-

cises alone.

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