# Compare between the effectiveness of back strengthening exercises versus segmental stabilizing exercises to improve functional disability among working women with chronic low back pain

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**ABSTRACT**

**BACKGROUND**: Lbp is one of the most common musculoskeletal disorders in modern society with a global point prevalence of 9.4 %, LBP is a leading cause for disability and work absence, and causes considerable burden on individuals, their families, the economy, and health care systems .

Various interventions are used for effective treatment of LBP. The management of LBP comprises a range of different interventional strategies, including drug therapy and nonmedical interventions. The use of various non-pharmacological and non-invasive methods such as exercise, mobilization, and manipulation is well known in LBP treatment. Core stability exercise is a common exercise modality in the treatment of LBP. Core stability exercises improve the strength of deep muscles of the trunk and low back disability with LBP.

LBP can limit daily activities and cause temporary or permanent inability to work. Nonspecific LBP is caused by postural deviations. The characteristics of chronic LBP are heavy pain, worsening with exertion especially in the afternoon, relieved with rest, absence of neurological and muscle contraction, and antalgic posture, associated with inactivity and poor posture.

**AIMS AND OBJECTIVES**: To compare between the effectiveness of back strengthening exercises versus segmental stabilizing exercises to improve functional disability among working women with chronic low back pain.

**METHODOLOGY:** 30 patients with chronic low back pain were randomly selected according to inclusion and exclusion criteria and divided into two groups – Group A: treated with back strengthening exercises, Group B: treated with segmental stabilization exercises.

**RESULT:** In our study both the groups showed statistically significant results but in comparison, the group treated with segmental stabilization exercise showed a significant effect on reducing the scores of both the outcome measures (VAS & OLBPDQ) than the group treated with traditional back strengthening exercises.

**CONCLUSION:** This study concludes that segmental stabilizing exercises is more effective in comparison to back strengthening exercises for improving functional disability among working women with chronic low back pain.

**KEYWORDS:** chronic low back pain, core stability exercises, strengthening excercises, Low back exercises

# INTRODUCTION

Low back pain(LBP) is defined as pain or discomfort in the lumbosacral region, localized below the last rib and above the gluteal crease, with or without referred leg pain.1 While LBP can result from known or unknown abnormalities or diseases,2 in more than 85 % of cases LBP is considered non-specific.3 Most episodes are short-lasting and without, or with little lasting consequences, recurrent episodes are common and LBP is increasingly being understood as a long-lasting condition with varying trajectories.2Low back pain is usually categorized in 3 subtypes: acute, sub-acute and chronic low back pain. This subdivision is based on the duration of the back pain. Acute low back pain is an episode of low back pain for less than 6 weeks, sub-acute low back pain between 6 and 12 weeks and chronic low back pain for 12 weeks or more.4

Lbp is one of the most common musculoskeletal disorders in modern society with a global point prevalence of 9.4 %5, LBP is a leading cause for disability and work absence5,6,7, and causes considerable burden on individuals, their families, the economy, and health care systems 8

This review has the purpose of highlighting the evidence supporting the different rehabilitative techniques described for its management. The effect of exercise therapy was examined through changes in the main clinical outcomes (pain, disability,) quality of life (QoL) and the targeted aspects of physical function (muscle strength, mobility, muscular activity and flexibility).

One important risk factor for low back pain is weakness of superficial back muscles, and strengthening of these muscles is often associated with significant improvements of CLBP, as well as with decreased functional disability.Another independent risk factor for CLBP is the weakness and lack of motor control of deep trunk muscles, such as the lumbar multifidus (LM) and transversus abdominis (TrA) muscles.Lumbar stabilization exercises are aimed at improving the neuromuscular control, strength, and endurance of the muscles that are central to maintaining the dynamic spinal and trunk stability.

Excess weight produces greater pressure on structures (intervertebral discs, nerve roots, interapophyseal joints, and interspinous ligaments) and cause pain. Other factors contributing to LBP in obese patients are flaccidity and abdominal wall distention, which prevents proper spinal support 45,46. Nonspecific LBP is caused by postural deviations. 47. The use of various non-pharmacological and non-invasive methods such as exercise, mobilization, and manipulation is well known in LBP treatment.50,51,52 Core stability exercise is a common exercise modality in the treatment of LBP.53 To decrease pain and increase back specific functional status in patients with LBP, core stability exercise is more effective than general exercise.54 Myofascial release technique is another method among the possible management options in the treatment of chronic musculoskeletal pain.48 It has been demonstrated that myofascial release technique produces a significant improvement in both pain and disability.49

Physiotherapeutic protocols addressing both the superficial and the deep muscles seem to be effective in the treatment of CLBP and the results of both kind of treatments is compared with the help of visual analog scale(VAS) scale for pain assessment & Oswestry Low back disability index. Clinical importance and needs to be further clarified through research. Hence, the present study was done with an objective to compare the short-term effect of lumbar stabilization, traditional strengthening of back muscles on pain, functional capacity in individuals with CLBP and find a better approach in clinical practice.

Inspite of several articles no literature was found to compare between the effectiveness of back strengthening exercises versus the effect of segmental stabilizing exercises to improve functional disability among working women with chronic back low back pain hence this study has been proposed and conducted.

# METHODOLOGY

# It is a comparative study in which 30 patients diagnosed with CLBP was randomized in two group depend on inclusion and exclusion criteria . Study was done for 12 weeks (30 mins session/day, 5 days a week, for a total of 12 weeks) in Ananta Institute of Medical Sciences & Research Center, Udaipur

#### INCLUSION CRITERIA

1. Age group - 30 to 50 yrs of age
2. Office going Women
3. Diagnosed with chronic low back pain

#### EXCLUSION CRITERIA

1. Any recent surgery in back region
2. Rheumatologic disorders
3. Spine infections
4. Any recent injury to lower back
5. Neurological disorder
6. Presence of malignant tumor
7. High fever
8. Mentally retarded & Uncooperative patients

# OUTCOME MEASURES: Visual Analog Scale (VAS) And Oswestry low back pain disability questionnaire (OLBPDQ)

# PROCEDURE

After collecting the written consent form the patients selected by inclusion and exclusion criteria, they were divided into two groups- group A and group B. Group A was treated with back strengthening exercises & group B was treated with segmental stabilization exercises

Both the groups were treated with therapeutic ultrasound for 10 mins, at intensity of 1.4 w/cm2. After electrotherapy treatment the patients were given exercise protocol. The total session took about 30 mins.

Back Strengthening Exercises included isometrics,

Pelvic bridging,

extension exercises(spinal extension, leg extension in prone lying) graded flexion(knee to chest)

Progressed to curl-ups

**Segmental Stabilization Exercises included**

Isometric abdominal drawing in maneuver in crook lying,

Progressing to leg lifts with holding contraction.

Quadruped Opposite Arm/Leg Raise for erector spinae or multifidus

Bridge with Leg Abduction: a standard bridge with a leg abduction (lifting the leg to the side) to engage the gluteus and stabilize the pelvis



Quadruped Opposite Arm/Leg Raise

Both groups were treated for 30 mins session per day, for 5 days a week, for 12 weeks.Home exercises for low back pain was taught to the patients of both the groups.Pre & Post values of outcome measuring tools were kept safely for analysing the data.

# DATA ANALYSIS

Mean,standard deviation, ‘t’ test and unpaired ‘t’ test were performed for analysis of pre and post data evaluation within and between groups .

#  RESULTS

After screening 40 patients for study eligibility, a total of 30 patients were included for analysis, of whom 15 were in the Group A (back strengthening exercises) and 15 were in the Group B (segmental stabilization exercises).

Group A had a mean age of 40.53 years and Group B had a mean age of 40 years. The demographic data has been presented in tables and depicted in figure.

 Table 1 Patients clinical & demographic data, according to the group

|  |  |  |
| --- | --- | --- |
| Features | Group A (n=15) | Group B (n=15) |
| Mean age (yrs) | 40.53 | 40 |
| Weight (kg) | 74.61 | 73.60 |
| Height (cm) | 1.67 | 1.65 |

 Table 2a. Analysis of pre & post test values of VAS within group A

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| VAS | N | MEAN | Std. Dev. | S.E.M | df | t | p |
| Pre | 15 | 5.67 | 0.9759 | 0.2519 | 14 | 17.9603 | <0.05\* |
| Post | 15 | 1.8 | 0.6761 | 0.1745 |

\*Significant (p<0.05)



INTERPRETATION: Above table & graph shows the comparison of pre & post values of VAS within group A. The mean pre test score is 5.67, mean of post test score is 1.8. For paired t -test t value is 17.96 & p value is <0.05 which is significant.

 Table 2b. Analysis of pre & post test values of OLBPDQ within group A

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| OLBPDQ | N | MEAN | Std. Dev. | S.E.M | df | t | p |
| Pre | 15 | 17.6666 | 2.5541 | 0.6594 | 14 | 32.0419 | <0.05\* |
| Post | 15 | 3.0666 | 0.9611 | 0.2481 |

\*Significant (p<0.05)



INTERPRETATION: Above table & graph shows the comparison of pre & post values of OLBPDQ within group A. The mean pre-test score is 17.67, mean post test score is 3.07. For paired t -test t value is 32.04 & p value is <0.05 which is significant.

Table 3. Analysis of pre & post test values of VAS within group B

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| VAS | N | MEAN | Std. Dev. | S.E.M | df | t | p |
| Pre | 15 | 5.53 | 1.302 | 0.3361 | 14 | 18.6991 | <0.05\* |
| Post | 15 | 1.2666 | 0.7037 | 0.1817 |

\*Significant (p<0.05)



INTERPRETATION: Above table & graph shows the comparison of pre & post values of VAS within group B. The mean pre test score is 5.53, mean of post test score is 1.27. For paired t -test t value is 18.7 & p value is <0.05 which is significant.

Table 4. Analysis of pre & post test values of OLBPDQ within group B

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| OLBPD Q | N | MEAN | Std. Dev. | S.E.M | df | t | p |
| Pre | 15 | 17.2666 | 2.5541 | 0.6594 | 14 | 26.6333 | <0.05\* |
| Post | 15 | 2.0666 | 0.9611 | 0.2481 |

\*Significant (p<0.05)

 INTERPRETATION: Above table & graph shows the comparison of pre & post values of OLBPDQ within group B. The mean pre-test score is 17.2666, mean post- test score is 2.0666. For paired t -test t value is 26.6333 & p value is <0.05 which is significant



Table 5. Analysis of post test values of VAS between group A & B

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| VAS | N | MEAN | Std. Dev. | S.E.M | Df | t | p |
| GRP A | 15 | 1.8 | 0.6761 | 0.1745 | 28 | 2.1166 | <0.05\* |
| GRP B | 15 | 1.27 | 0.7037 | 0.1817 |

\*Significant (p<0.05)



INTERPRETATION: Above table & graph shows the comparison of post test values of VAS between group A&B. The mean post test score of grp A is 1.8, mean of post test score is 1.27 For unpaired t-test t value is 2.12 & p value is <0.05 which is significant.

Table 6. Analysis of post test values of OLBPDQ between group A & B

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| OLBPD Q | N | MEAN | Std. Dev. | S.E.M | Df | t | p |
| GRP A | 15 | 3.0666 | 0.9611 | 0.2481 | 28 | 2.8493 | <0.05\* |
| GRP B | 15 | 2.0666 | 0.9611 | 0.2481 |

 \*Significant (p<0.05)



INTERPRETATION: Above table & graph shows the comparison of post treatment values of OLBPDQ between group A&B. The mean post test score of grp A is 3.07, mean of post test score of grp B is 2.07. For un-paired t -test t value is 2.85 & p value is <0.05 which is significant.

# DISCUSSIONS

The aim of this study was to compare the effectiveness of traditional back strengthening exercises versus that of segmental stabilising exercises to improve functional disability in chronic low back pain. Both treatments were effective in relieving pain & in decreasing functional impairment.Our findings suggest that segmental stabilization exercises reduce subject’s pain more effectively immediately after the end of treatment protocol over general back strengthening exercise protocol with statistical significance. The stabilizing exerxise treatment approach was more effective than other conservative treatment approaches which mainly involved conventional exercise programs. This could be explained with the following possible reasons.

Firstly, the stabilization exercise uses the drawing-in maneuver which helps in coactivating the transversus abdominis and multifidus muscles than other exercises which concentrate on strengthening the surrounding muscle. The drawing-in maneuver develops the pattern of setting the deep abdominal and multifidus in feedforward pattern and helps to maintain the holding capacity and in coordination with the global muscles.

Secondly, tactile facilitation along with verbal cues were also given to explain the muscles encircling the trunk which acts as feedback and

Third reason may be that all the exercises were performed consecutively one after the other without any repetitions and no rest period was given to maintain the posture. This helps to sustain the co-contraction of the muscle while performing the exercise. Primary training in crook lying (70°–90° of knee flex- ion) is slowly progressed to prone lying to sitting followed by functional activities. Extremity motions were added and were used to stimulate muscle endurance and strengthen the trunk muscles. In prone position the load to lumbar spine increases on extremity loading hence extension exercise were initiated in quadruped position to maintain lumbar in neutral position and for patient to learn control. The quadratus lumborum acts as a stabilizer in frontal and transverse plane. Hence side propping position was maintained to activate quadratus lumborum and external oblique. The same recruitment of muscle can be taught to patients by self-palpation and sitting and rocking on a swiss ball. For this reason, stabilization exercises can be included in home programs. Lumbar stabilization exercise also strengthens the lumbar extensors thereby improving functional ability and lumbar range of motion.

Both the exercise groups showed statistical significance but the “stabilization exercise” exercise group showed more significance over the general exercise group in reducing pain in chronic low back pain. So specific stabilization exercise was superior in the improvement of pain and reduction of disability than the general exercise group.

For the lumbar stabilization group, score changes for VAS & OLBPDQ were significant within the group. However when between group study was done and lumbar stabilization group was compared to the one with traditional strengthening excercise group, the pain was found to be significantly reduced in the lumbar stabilization group with P-value less than 0.05 compared to strengthening exercise. OLBPDQ scores were found to be significantly reduced with P-value less than 0.05 when compared to the strengthening group.

The back strengthening grp, score changes for VAS,OLBPDQ were more significant within the group. However when between the group analysis was done and the back strengthening group was compared to the other group, the pain significantly reduced in the stabilization group compared to the traditional back strengthening group. When disability was assessed, the OLBPDQ score was significantly reduced with P-value less than .05.

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