

Effect of Core Strengthening in Reducing Low Back Pain

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Abstract: Core strengthening has become a major trend in rehabilitation. The term has been used to connote lumbar stabilization, motor control training, and other regimens. Core strengthening is in essence, a description of the muscular control required around the lumbar spine to maintain functional stability. Despite Core strengthening has been promoted as a preventive regimen, as a form of rehabilitation, and as a performance-enhancing program for various lumbar spine and musculoskeletal injuries.

Keywords: Core Strengthening, Lumbar Sabilization, Functional Stability, Musculoskeletal Injuries

1. Overall Objective of the Project

To understand the concept of core strengthening in reducing Low Back Pain

2. Results

The interventions ranged from 4 weeks. In total, 15 of the intervention studies exclusively utilized Core strengthening exercise training program, another 15 studies exclusively utilized in just taking rest without following the exercise protocol. A total of 15 studies who performed core strengthening programme achieved positive statistically significant results between the baseline and the follow-up quantitative measurements.

3. Conclusions

After a period of 4 weeks of Core strengthening exercise programme, 15 subjects who have undergone Core strengthening exercise programme showed a positive result in reducing the pain and they can perform regular activities then the previous days before to exercise programme.

4. Methods and Methodology

4.1 Review of Literature

1) Yolanda ruiz, Javier bilbao, azucena ruiz and jon baraiazar did study on "low back pain and lumbosciatalgia treatment with core strengthening", and concluded that two similar groups with low back pain and lumbosciatalgia in chronic phase who have been treatment with the same kind of interferential currents but with difference in treatment time.

Patients of the 20 minutes group improve according to the brief pain inventory questionnaire pain, they reduce the maximum intensity, improve the general activity and the mood and the ability to walk, between 33% and 50%. According to the scale of facial expression, they improve their facial expression from 2 to 5.

In the patients of the 10 minutes group, the pain relief is about a 15% or 20%. According to the brief pain

inventory questionnaire pain, the maximum intensity of pain in the last 24 hours after 3 weeks of treatment has changed on treatment rehabilitation. According to the scale of facial expression, it increases from 2 to 5.

- 2) Lewis A, Morris ME, Walsh C done a survey on "Are physiotherapy exercises effective in reducing chronic low back pain?" concluded that physiotherapy prescribed exercise programmes were found to be effective in reducing pain in patients with chronic low back pain. Results were inconclusive for the superiority of any specific technique or exercise format.
- 3) Bigos SJ, Holland J, Holland C, Webster JS, Battie M, Malmgren JA done a survey on "high-quality controlled trials on preventing episodes of back problems: systemic literature review in working-age adults" and concluded that exercise interventions are effective and other interventions are effective for preventing episodes of back problems in working age adults.

4.2 Aim of Study

The primary aim of the study is to find out the core strengthening program is more effective in reducing chronic low back pain.

4.3 Objectives

The main objective of the study is to reduce chronic low back pain, analyze the results by using Modified Oswestry low back pain disability questionnaire and visual analogue scale

Material

Assessment chart

Assessment Tools

Modified Oswestry low back pain disability questionnaire VAS

4.4 Methodology

a) Research design

The design that is used in this study is the quasi experimental design

b) Study setting

The study was conducted at

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- JNTU, Kakinada.
- District Sports Ground, Kakinada.

I have selected 32 subjects, 2 subjects are discontinued because of their personal reasons. I have divided the remaining 30 subjects into two groups with 15 subjects in each group.

- Group A,
- Group B.

Group A: It is selected to treat core strengthening exercises along with their daily routine.

Group B: They have taken a strict 1 month rest without any exercise other than their daily routine activities.

Number of Subjects

I have taken 30 subjects with chronic low back pain.

Inclusion Criteria

Subjects are selected for the study if they fulfill the following criteria—

- Clinically diagnosed as chronic low back pain for more than 8 weeks.
- Those who are willing to participate in the study and willing to take treatment for 4 weeks.
- Subjects aged between 20-30 years.
- Pain in the lumbar region of spinal cord.
- Stiffness on the low back region.

Exclusion Criteria:

- Subjects suffering with infective conditions because it could spread the infection or exacerbate due to the stimulatory effects of current.
- Subjects with malignant tumors.
- Subject with artificial pacemakers, a demand unit must sense the electrical activity of the heart, thus avoid an electric device that may interfere with it.
- Subjects with large open wounds.
- Subjects with decreased circulation.
- Subjects with osteoporosis.

Parameters:

- Pain with visual analog scale
- Modified Oswestry scale for functional disabilities.

Tools:

Modified Oswestry low back pain disability questionnaire—

Section 1: Pain intensity---

- A- I can tolerate the pain without using pain medication.
- B- The pain is bad, but I can manage without having to take pain medication.
- C- Pain medication provides me with complete relief from pain.
- D- Pain medication provides me with moderate relief from pain.
- E- Pain medication provides me with mild relief from pain.
- F- Pain medication has no effect on my pain.

Section 2: Personal care (e.g., washing, dressing)--

- A- I can take care of myself normally without causing increased pain.
- B- I can take care of myself normally, but it increases my pain.
- C- It is painful to take care of myself, and i am slow and careful.
- D- I need help, but I am able to manage most of my personal care.
- E- I need help every day in most aspects of my care.
- F- I do not get dressed; I wash with difficulty, and stay in bed.

Section 3: lifting---

- A- I can lift heavy weights without increased pain.
- B- I can lift heavy weights, but it causes increased pain.
- C- Pain prevents me from lifting heavy weights off the floor, but i can manage if weights are conveniently positioned (e.g., on a table).
- D- Pain prevents me from lifting heavy weights, but i can manage light to medium weights if they are conveniently positioned.
- E- I can lift only very light weights.
- F- I cannot lift or carry anything at all.

Section-4: walking---

- A- Pain does not prevent me from walking any distance.
- B- Pain prevents me from walking more than 1 mile. (1 mile=1.6km)
- C- Pain prevents me from walking more than ½ mile.
- D- Pain prevents me from walking more than ¼ mile.
- E- I can walk only with crutches or a cane
- F- I am in bed most of the time and have to crawl to the toilet.

Section-5: sitting---

- A- I can sit in any chair as long as i like.
- B- I can sit in my favorite chair for as long as i like.
- C- Pain prevents me from sitting for more than 1 hour.
- D- Pain prevents me from sitting for more than ½ an hour.
- E- Pain prevents me from sitting for more than 10 minutes.
- F- Pain prevents me from sitting at all.

Section-6: standing---

- A- I can stand as long as i want without increased pain.
- B- I can stand as long as i want but it increases my pain.
- C- Pain prevents me from standing for more than 1 hour.
- D- Pain prevents me from standing for than ½ an hour.
- E- Pain prevents me from standing for more than 10 minutes.
- F- Pain prevents me from standing at all.

Section-7: sleeping---

- A- My sleep is never disturbed by pain.
- B- I can sleep well only using pain medication.
- C- Even when i take medication, i sleep less than 6 hours.
- D- Even when i take medication, i sleep less than 4 hours.
- E- Even when i take medication, i sleep less than 2 hours.
- F- Pain prevents me from sleeping at all.

Section-8: travelling---

- A- I can travel anywhere without increased pain.
- B- I can travel anywhere, but it increases my pain.
- C- My pain restricts my travel over 2 hours.

- D- My pain restricts my travel over 1 hour.
- E- My pain restricts my travel to short necessary journeys less than 1/2hour.
- F- My pain prevents all travel except for visits to the physician / therapist or hospital.

- 40% to 60%--severe disability
- 60% to 80%--crippled
- 80% to 100%--bed bound.

Section-9: employment / homemaking---

- A- My normal homemaking / job activities do not cause pain.
- B- My normal homemaking / job activities increase my pain, but i can still perform all that is required of me.
- C- I can perform most of my homemaking / job duties, but pain prevents me from performing more physically stressful activities (e.g., lifting, vacuuming)
- D- Pain prevents me from doing anything but light duties.
- E- Pain prevents me from doing even light duties.
- F- Pain prevents me from performing any job or homemaking chores.

- A=1
- B=2
- C=3
- D=4
- E=5
- F=6

- 0 to 20%-- minimal disability
- 20% to 40%-- moderate disability

Visual analog scale

- | | | | | | | | | | | |
|---|---------------------------|---|---|---|---|---|---|---|---|----|
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 1 | To 2 –annoying pain. | | | | | | | | | |
| 3 | To 4 –uncomfortable pain. | | | | | | | | | |
| 5 | To 6 –dreadful pain. | | | | | | | | | |
| 6 | To 8—horrible pain. | | | | | | | | | |
| 9 | To 10—agonising pain. | | | | | | | | | |

Core Strengthening Exercise Programme:

4 Different core strengthening exercises were thought to 15 Subjects, and they were practiced for exercise protocol for 4 weeks regularly.

Each player followed the same guidelines:

- 1st week: 3 repetitions for 10 sec each, twice daily
- 2nd week: 5 repetitions for 20 sec each, twice daily
- 3rd week: 7 repetitions for 30 sec each, twice daily
- 4th week: 10 repetitions for 50 sec each.

Readings were taken on the 1st day of the exercise programme and on final day, and hence the calculations are taken accordingly.

The images of the exercises are displayed below.



Table Top



Bridging



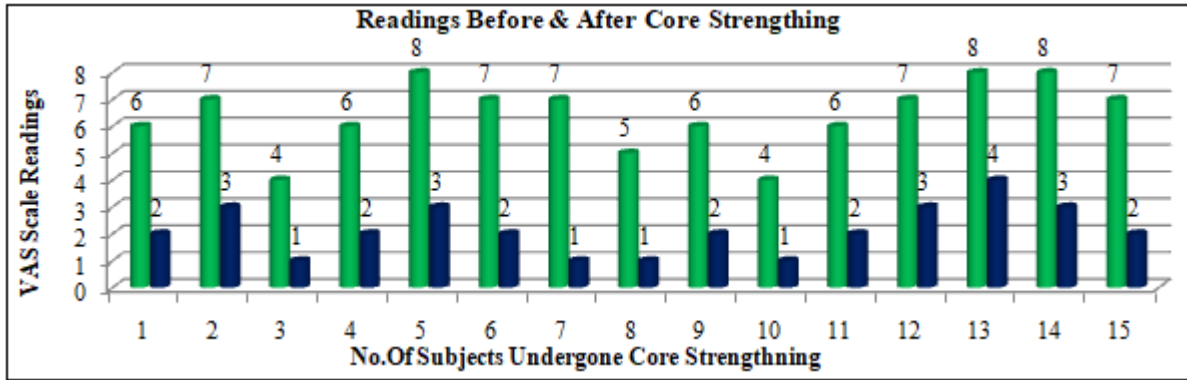
Pilates Crunch



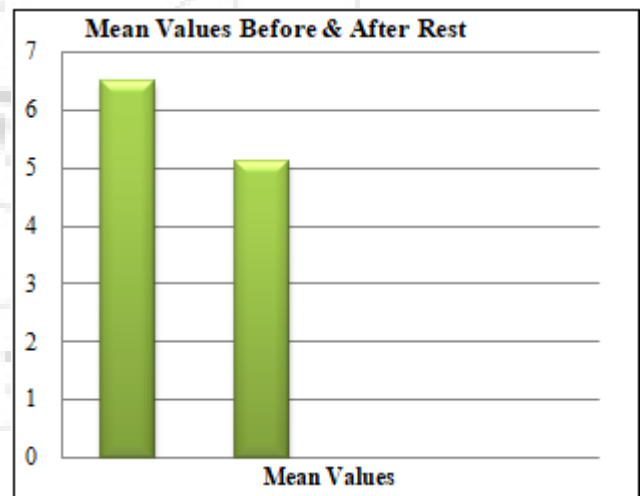
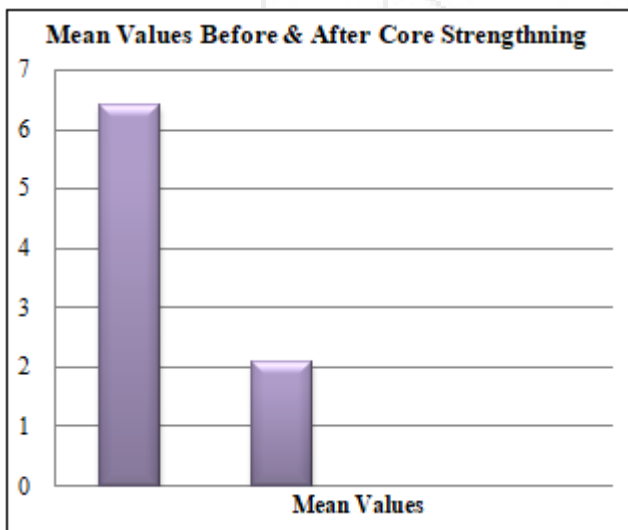
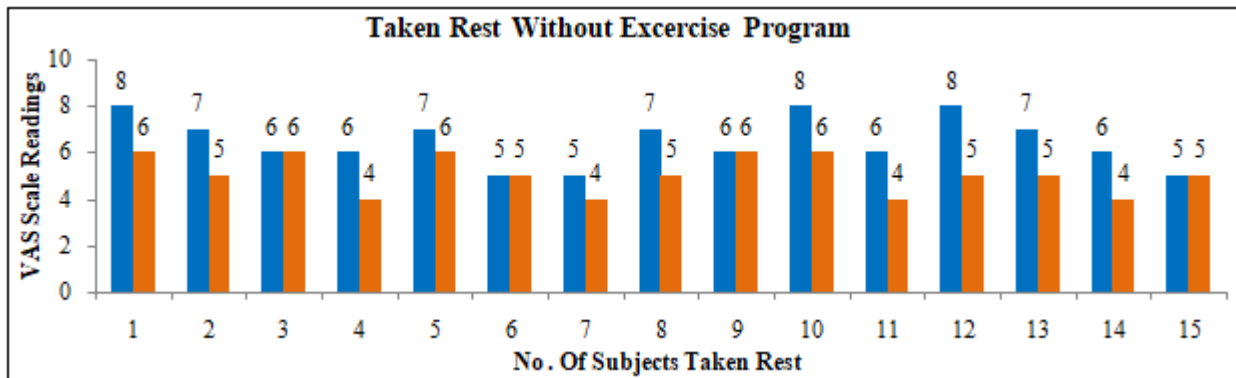
Airplaining

Data Presentation

Readings Before & After Core Strengthening															
S.No	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Before	6	7	4	6	8	7	7	5	6	4	6	7	8	8	7
After	2	3	1	2	3	2	1	1	2	1	2	3	4	3	2



S.No	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Before	8	7	6	6	7	5	5	7	6	8	6	8	7	6	5
After	6	5	6	4	6	5	4	5	6	6	4	5	5	4	5



The above graph shows the variations between the recovery before and after the core strengthening exercise programme.

The above graph clearly indicates the difference between recovery, before and after the rest period.

5. Discussion

- During the period 4 weeks, I've got different types of feedback from the subjects whom I have trained.
- 1st week of exercise programme out of 15, 6 players noticed increased in pain then the previous days. But they showed in performing the exercise.
- After 1 week of training, they noticed gradual decrease of pain.
- After 3 weeks of training programme every one gave a remarkable feedback that they can easily perform the

exercise protocol without any discomfort, when compared to previous days before exercise programme

- After 4 weeks of training session all the 15 players showed positive results to the core strengthening exercise programme, they observed a good change in reducing their low back pain

6. Conclusion

- Core strengthening programme shows a tremendous result in reducing the chronic low back pain.
- After a period of 4 weeks of exercise programme the values from both groups were taken, the subjects who undergone core strengthening exercise programme have recovered from back pain much better.
- But the subjects who haven't taken the core strengthening programme have showed less result in their recovery when compared to the players who have undergone exercise programme.
- **Finally I would like to conclude that CORE STRENGTHENING EXERCISE PROGRAMME shows a good prognosis in reducing the low back pain.**

Assessment Chart

- 1) Subjective
- 2) Objective

Subjective

Name:
Age:
Gender:
Occupation:
Address:
Chief complaint:

History

- a) Present history: related to chief complaint.
- b) Past history: related to present condition.
- c) Past medical history: any treatment taken in the past for present condition.
- d) Family history:
- e) Personal history: smoking, CVA.
- f) Socio economic status:

Pain Assessment

- Site:
- Duration:
- Onset:
- Type:
- Irritability:
- Nature:
- Severity:
- 24 hours pattern:
- Aggravating factors:
- Relieving factors:

Visual Analog Scale (VAS):

0 1 2 3 4 5 6 7 8 9 10

Vital Signs

- Blood pressure
- Heart rate
- Respiratory rate
- Temperature

Objective

Observation:

- General body built---
 - i. Moderate
 - ii. mild
 - iii. obese
- attitude of patient while coming to department
- spinal alignment, pelvic obliquity
- buttock crease
- muscle wasting
- edema
- tropical changes
- Posture: observe when the patient walks; evaluate any gross deviation from normal physiological curve of the spine.
e.g., hyper Lordosis
Flat back
Scoliosis
Kyphosis
- Erect posture should be observed from the front, back and sides. Posterior pelvic tilt may result from tight or over developed low ob

Weakness of hip flexors or localized muscular spasm may result in obliteration of normal lumbar Lordosis into flat back.

It puts stress on the anterior surface of the bodies of lumbar

GAIT

Observation of gait in sagittal plane and frontal plane for any gait deviation. Mainly anterior, posterior and lateral pelvic tilt is observed deviation of the normal angle of pelvic tilt plays a significant role in the incidence of low back pain. It is assessed in standing. Anterior pelvic tilt may occur as a result of the protruding abdomen. e.g., obese people, tight low back muscles, tight hip flexors weakness in the abdominal muscles, tight hamstrings. Lateral pelvic tilt, pelvic drops on one side. It could be due to limb length disparity, unilateral lumbo sacral strain. Structural scoliosis (or) scoliosis due to unilateral muscular spasm.

On Palpation

- Tenderness: examined by picking up and rolling manipulation of various muscle group of back and lower limb.
- Edema
- Muscle spasm: over paravertebrae region
- Trigger points: over paravertebrae region
- Nodules
- Tone: normal firmness / flabby / increased firmness.

Range and Rhythm of the Spine

Lumbo pelvic rhythm is tested. Movements to be examined at the lumbosacral complex are—

- a) Flexion
- b) Extension
- c) Rotation

Movement should be full range and pain free with over pressure. It symptoms should be reproduced by performing movement enough to the point of first increase symptoms.

Flexion: Ask the patient to bend forward (toe touching) from the stride standing without bending the knees. Restriction of flexion indicates the soft tissue flexibility at the lumbo sacral complex.

Persistence of lumbar lordosis instead of kyphosis even at the terminal range of flexion is an indication of hyper mobility of the lumbo sacral spine.

Extension: From erect stride standing posture, the patient is asked to extend the whole spine beyond mid line to a maximum range. It produces pain due to compression of the structures.

Lateral flexion: The patient is asked to bend his trunk to the side with knees extended and over the lateral aspect of the thigh. If lateral flexion towards the painful side aggravated the pain the lesion could be either due to intra-articular pathology (or) disc lesion. If lateral flexion away from the painful side increases the pain the lesion may be articular (or) muscular origin.

Rotation: It is tested with the patient in sitting with hip and knee in flexion. The movement as tested on both sides.

Neurological Examination

- Sensory evaluation
- Motor power
- Atrophy of the muscle
- deep tendon reflexes group

Sensory evaluation: Sensory paraesthesia in the distribution of a particular dermatome can detect the neurological level of the lesion. Depending on nerve lesion numbness is present.

e.g., L5- Lower back, thighs, legs,
Posterior lateral aspect of buttock,
Posterior lateral aspect of thigh up to dorsum of foot.

S1- Middle of buttock,
Posterior aspect of thigh,
Lateral side of knee,
Lateral malleoli,

Primary sensation

Touch,
Pain,
Temperature

Motor power: MRC GRADING---

- 0 -- no contraction
- 1 -- flicker of contraction
- 2 -- full ROM on elimination of gravity
- 3 -- full ROM against gravity

- 4 -- full ROM with minimum resistance
- 5 -- full ROM with maximum resistance

Depending on nerve lesion there is muscular weakness

Lesion of L3-L4 - Quadriceps weakness

Lesion of L4-L5 - Weakness of dorsiflexion and toe Extension.

Lesion of L5-S1 - Plantar flexion of foot and great toe, difficulty in walking on toes.

- **Endurance:** Early fatigue indicates lack of endurance. Muscle endurance is tested by repeated resistive isotonic movement to the muscle.
- **Muscular atrophy:** Assessment by measuring the girth of the thigh. Depending on nerve lesion atrophy is present.
- **Deep tendon reflex:** It provides information about the integrity of the reflex arc, in identifying the level of the lesion.
- **Quadriceps tendon reflex:** If it is sluggish (or) absent, it indicates lesion at L4 root involving L3-S1 level.
- **Medial and lateral hamstring reflex:** If it is reduced (or) absent, it indicates lesion at L5-S1 level.
- **Ankle jerk:** If it is sluggish (or) absent indicates the lesion at S1 root involving L5-S1 disc.
- **Plantar response :** Weakness (or) plantar response indicates lesion at S1.

Special Test:

- 1) Leveque's sciatic nerve test.
- 2) Bowstring test.
- 3) Slump test for mobility at the intervertebral foramen and the spinal cord.
- 4) Pitfalls SLR test used to test mobility of 4th and 5th lumbar nerve root.
- 5) Test for pain of muscular origin by doing resisted isometric test.
- 6) Gaenslen's test.

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