



# EFFECTIVENESS OF CORE MUSCLE STRENGTHENING EXERCISES ON LUMBAR FLEXION AND EXTENSION RANGE OF MOTION IN POST MENOPAUSAL WOMEN- AN EXPERIMENTAL STUDY

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## Abstract :

**OBJECTIVE:** The purpose of this study is to examine the effectiveness of core muscle strengthening exercises on lumbar flexion and extension range of motion in post-menopausal women.

**METHODOLOGY:** Subjects were selected according to inclusion criteria and the purpose of the study was explained to subjects and prior consent were taken.

**RESULT:** candidates participated in the study, Paired T test was done .The result obtained on post menopausal women by core muscles strengthening exercises showed increase in lumbar flexion and extension range of motion, and results were found to be extremely significant .

**CONCLUSION:** From the above study it can be concluded that core muscles strengthening exercises helps in improving lumbar flexion and extension range of motion in post menopausal women.

**KEY WORDS:** core strength, post menopausal women, lumbar ROM

## I. INTRODUCTION

Menopause is defined as the complete cessation of menstruation for 12 months or more which is a normal physiological change experienced by every woman. The average age of natural menopause in Indian women is determined to be 45-55 years in Indian women according to World Health Organization. The menopausal period is a stage in a women's life that occurs as a result of loss of follicular activity of ovaries that eventually leads to a reduction in estrogen production.[1]

Menopausal women experience a number of physical changes that are loss of muscle strength and flexibility, which contributes to majority of musculoskeletal disorders. Core should be stable for optimal posture and to move the limbs. Stable spine is attained, largely by core muscles and partly by passive and neural elements.[5] Muscle mass and eventually muscle strength is reduced in postmenopausal women due to deficiency of oestrogen. Reduced muscle strength have an effect on lumbar flexibility and this further leads to reduction in range of motion.[6] Improving the flexibility of the muscle, tendons and ligaments in the back increases the range of motion and assists with the patient's functional movement.[7] Hence, this study mainly focuses on the core strengthening for improving lumbar range of motion in postmenopausal women.

## II. NEED OF STUDY

Postmenopausal women experience a variety of symptoms due to underlying hormonal changes mainly the reduction in the level of oestrogen. Due to the deficiency of oestrogen in these women there are few metabolic changes occurring in the muscle which results imbalance between protein synthesis and protein breakdown. This imbalance leads to further decrease in muscle mass and strength of muscle.[8] The reduced strength also indirectly influences the range of motion and flexibility at various joints. A decrease in core muscle strength is also observed in postmenopausal women which can lead to a decline in the flexibility and range of motion of lumbar spine as the core muscles are mostly present over this region.[9] Hence, this study is aiming to evaluate the effectiveness of core muscle strengthening on lumbar ranges in postmenopausal women.

## III. AIM

To study the effectiveness of core muscle strengthening exercises on lumbar flexion and extension range of motion in postmenopausal women at end of 4 weeks.

#### IV. OBJECTIVES

To evaluate the effectiveness of core muscle strengthening exercises on lumbar flexion range of motion in postmenopausal women after 4 weeks.

To evaluate the effectiveness of core muscle strengthening exercises on lumbar extension range of motion in postmenopausal women after 4 weeks..

#### V. METHODOLOGY

STUDY DESIGN: Experimental study.

SAMPLE SIZE: 44

#### VI. INCLUSION CRITERIA

Age – 45 to 55 years.

Grade 1-3 on abdominal MMT.

Women with lower segment caesarean section and full-term normal delivery.

Multiparous women

Women with BMI between 18.5(normal)-29.9(overweight)

Nonspecific low back pain.

Modified Schober's test range less than 3 cm (i.e., = 15 – 10 cm)

#### VII. EXCLUSION CRITERIA

Women with Hysterectomy.

Women with any other musculoskeletal disorder such as – PIVD, Lumbar radiculopathy, Lumbar Spondylolisthesis, fracture.

Women diagnosed with Uterine prolapse or surgically repaired the prolapse.

Women with recent surgical history and recent abdominal surgery,

Women with knee osteoarthritis.

Women doing yoga or involved in any other physical activity, gym activity.

Women with cardiovascular and neurological disorder.

Women with psychological disorder and not able to follow commands.

#### VIII. OUTCOME MEASURE

##### 1. Modified Schober's test:

**Flexion- Reliability ICC:0.91; Validity: r =0.67**

Locate a point between lumbosacral junction (midpoint between both PSIS)

Measure 10 cm above the lumbosacral junction and place another temporary mark "A."

Measure 5 cm below the lumbosacral junction and place another temporary mark "B."

Align the tape measure "0" with mark A and tape securely at this location. Have the participant stand with their feet shoulder-width apart and arms at their side.

Ask the participant to bend forward maximally and then measure the distance between mark A and mark B mark following the curvature of the back.

##### 2. Modified Schober's test:

**Extension- Reliability ICC:0.94; Validity: r =0.67**

Locate a point between lumbosacral junction (midpoint between both PSIS)

Measure 10 cm above the lumbosacral junction and place another temporary mark "A."

Measure 5 cm below the lumbosacral junction and place another temporary mark "B."

Align the tape measure "0" with mark A and tape securely at this location. Have the participant stand with their feet shoulder-width apart and arms at their side.

Ask the participant to bend backward maximally and then measure the distance between mark A and mark B mark following the curvature of the back.

## IX. PROTOCOL

Each exercise session consists of 30 minutes thrice a week for 4 weeks.[9]

The treatment protocol consists of 3 phases:

### 1. Warm-up (5 min):

- Neck flexion, extension and side flexion.
- Shoulder shrugs
- Wrist rotations
- Ankle dorsiflexion and plantarflexion
- Pelvic rotations
- Arm circles
- Leg swings
- Knee circles
- 5 repetitions of each exercise

### 2. Cool down-(5 min): (10 sec hold)

### 3. Stretching-

- Quadriceps stretch
- Gluteus stretches
- Seated hamstring stretch
- Neck stretch
- Triceps stretch
- Biceps stretch
- Butterfly stretch
- Hamstring stretch
- Calf Stretch

## X. DATA ANALYSIS

The subjects which fulfilled the inclusion criteria were selected for the study of effectiveness of core muscle strengthening exercises on lumbar flexion and extension range of motion – an experimental study.

The data was analyzed using Graph pad instat software for windows version.

The intragroup data was then subjected to statistical analysis using paired p value.

The intragroup data was then subjected to statistical analysis using paired t test.

## XI. RESULT

Effect of core muscles strengthening exercises on lumbar flexion range of motion.

FLEXION	PRE	POST	<i>t</i> VALUE	P VALUE
MEAN	2.322	2.569	15.932	<0.0001
SD	0.495	0.541		

(table.2)

Effect of core muscles strengthening exercises on lumbar extension range of motion.

	PRE	POST	t VALUE	P VALUE
MEAN	0.989	1.115	9.987	<0.0001
SD	0.271	0.314		

(table.3)

## XII. DISCUSSION

The aim of the present study was to find the effectiveness of core muscles strengthening exercises on lumbar flexion and extension range of motion in post-menopausal females.

The study was conducted on total 44 post-menopausal female between age group of 45-55 years with 4 weeks of intervention. All the participants in the study were assessed for the range of motion for flexion and extension on modified Schober's test for flexion and extension range of motion. The strength was assessed on isometric abdominal test, where the subjects between 1-3 grades, were selected and were given the intervention for 4 weeks. Participants were given the core muscles strengthening exercises protocol. post intervention again ranges were assessed by modified Schober's test for flexion and extension respectively. Aerobic exercises and resistance training are effective for pain and physical functions and improvements. Core muscles strengthening can improve trunk muscle function, balance and flexibility.[1]

When similar study was done in the year 2021, they concluded that stimulation of muscle fibers and tactile receptors via exercise programs may cause and increase proprioception. This might be due to effect of core muscles strengthening exercises on pain related symptoms associated with somatosensory input.[2]

For postural stability, spinal stability and balance, core muscles play an important role [2]

Like that, some balance function, stability was improved with core muscle strengthening exercise with significant difference in their study.

Similarly in the present study when intervention was given for the core muscles strengthening it was found that, this training help to stabilize the body and ensure balance of the body when moving the limb.

When similar study was done in 2022, strengthening the main muscles involved in this stability (transverse abdominal muscles and pelvic floor) maintains a greater balance and stability of trunk in everyday activities also core stability training lead to improved activity prediction.

A large part of core stability is focused on movements to enhance balance, power, and flexibility. Therefore, the improvement of balance and physical flexibility in experimental group seems obvious.[2]

Core strengthening is to align, lengthen and protect spine is to draw navel to spine. Abdominal hollowing or abdominal drawing in maneuver preferentially recruits internal oblique, multifidi benefit of hollowing is to decrease the laxity of sacroiliac joint more than abdominal bracing on core muscles strengthening capitalize on radiation concept whereby weaker muscles are facilitated by the stronger one's.[2]

## XIII. CONCLUSION

From the above study it can be concluded that the core muscle strengthening exercises can be used in increasing the ranges of the lumbar flexion and extension in postmenopausal women.

## XIV. LIMITATION

This study purely focuses on the effects of core muscle strengthening exercises on ranges of lumbar flexion and extension qualitatively and quantitatively measured on the basis of modified Schober's test.

Due to the unavailability of wearable sensors connected with recent software's likes 'OpenSim', open-source software system for biomechanical modelling simulation and analysis for conducting biomechanics research and motor control science.

## XV. FUTURE SCOPE AND STUDY

**Enhanced Stability:** Strengthening the core muscles helps improve spinal stability, which can contribute to better control and support during movements involving flexion and extension of the lumbar spine.

**Reduced Risk of Injury:** A strong core can help reduce the risk of injuries related to the lumbar spine by providing better support and protection to the spine and surrounding structures.

**Better Posture:** Core strengthening exercises can also promote better posture, which is essential for maintaining a healthy spine and optimal range of motion.

**Overall Functional Improvement:** By targeting the core muscles, these exercises can enhance overall functional abilities, making daily activities easier and more manageable for postmenopausal women.

It's important to note that individual responses to exercise can vary, so it's recommended to consult with a healthcare professional or a qualified fitness trainer before starting any exercise program, especially for this specific demographic group. Additionally, ongoing research and advancements in exercise science may further elucidate the benefits and optimal protocols for core muscle strengthening in postmenopausal women.

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