



EFFECTIVENESS OF CORE STABILIZATION EXERCISES ON STRENGTH AND ENDURANCE OF ABDOMINAL MUSCLES AMONG CLINICAL PHYSIOTHERAPISTS: AN EXPERIMENTAL STUDY

Physiotherapy

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ABSTRACT

A total of 30 clinical physiotherapists were included in this study. Subjects were selected according to the inclusion and exclusion criteria, and informed consent was taken, and they were prescribed a core stabilization exercise protocol for 4 weeks to be done 3 days in each week on alternate days. Strength, endurance and intensity of low back pain were assessed before and after the intervention. This study concluded that core stabilization exercises are effective in improving the strength and endurance of abdominal muscles among clinical physiotherapists

KEYWORDS

core stabilization, strength, endurance, clinical physiotherapists

INTRODUCTION

The core can be depicted as a “muscular box” where anterior part is covered by the abdominals, paraspinals and gluteals cover from posteriorly, the diaphragm acts as roof and the base is covered by pelvic floor and hip girdle musculature.^{1,2}

There are in total twenty-nine pairs of muscles within this box that together contributes by stabilizing the spine, pelvis, and kinetic chain during functional activities. The absence of these muscles make the spine unstable which makes it less compatible to bear the upper body weight as its ability to bear compressive forces become as little as 90N.^{1,3} This can be prevented if this whole system works properly by distributing and generating the force, leading to least compressive, translational, or shearing forces at the joints.^{1,4}

The trunk muscles are divided as either global or local muscles which include rectus abdominis or external oblique and local muscles which include transversus abdominis and lumbar multifidus.⁵ The global muscles help in producing torque and transferring load in between thoracic cage and the pelvis, whereas local muscles are involved in providing segmental stability of the lumbar spine during body movement as a whole and help in postural adjustments. Thus, it is important to work on the local muscles.^{6,7}

Non specific low back pain occurs in majority of cases which is not due to any particular reason and is because of abdominal mechanical stress such as manual handling activities and sports activities or it may be due to psychological stress causing activities such as unsatisfactory job profile or excessive cognitive demands or it may be develop instinctively.^{8,9} The decrease strength in superficial trunk muscles along with abdominal muscles, or insufficient control from multifidus and transverse abdominis are among the leading causes to low back pain.¹⁰

Physiotherapists are involved in the work-related musculoskeletal disorders due to their nature of work. They work in sectors such as teaching, hospitals, and rehabilitation centres and, so on. They are involved in activities which require them to lift patients, handle and transfer the dependent patients that are admitted in ICU and wards in hospital setting etc. All this impose a high risk of developing acute and chronic musculoskeletal disorders.^{11,12,13}

Core stability plays an important key role in cases of instability of spine. It can be defined as the ability of the body to control full range of motion of a joint thus preventing deformities, neurological problems and pain. It refers to strengthening of muscles around the spine and abdomen.^{14,15}

Core stabilization exercise is a type of rehabilitation and retraining of the core stabilizers of lumbar spine i.e. transverse abdominis and multifidus, to enhance the stability around the neutral zone. They

majorly contribute to enhance strength and stamina.^{14,15}

Considering the results in performed studies on effects of core stabilization exercises on strength and endurance of abdominal muscles, the motive of this study is to see the effects of 4 weeks of core stabilization exercises among the clinical physiotherapists as they are dynamically active.

METHODOLOGY:

Participants:

This experimental study was conducted in New Delhi at 3 clinical settings namely, A+OSM, Hauz Khas; Blessings Physiotherapy Clinic, Defence Colony; and Care 4 U wellness, East of Kailash with Chattanooga stabilizer pressure biofeedback and Swiss ball. A total of 30 clinical physiotherapists (both male and female) were selected aged 25-40 years and having normal BMI of 18.5-24.9. Physiotherapists with diagnosed mechanical low back pain, having VAS score of 5 or below and who had clinical working experience of 1 year or more.⁵ The subjects were excluded if they had any previous or current experience in core strengthening, subjects with acute or chronic low back pain, pregnant females, osteoporosis, spinal tumors, etc., history of lumbar/abdominal surgery, any known neuromuscular disorders, any cardiovascular or respiratory disorders, subjects who are in regular fitness program, history of fracture (spine, rib), any other systemic illness, spinal or disc pathologies.¹² The participants were thoroughly informed about this study and an informed consent was obtained prior to start of the protocol.

Procedure:

A total of 30 participants were taken and the core strength was measured using the “drawing in maneuver” in prone position with the Chattanooga Stabilizer pressure biofeedback. It was placed under the navel and the cuff was inflated upto 70mmHg until there was a decrease of 10mmHg. The subjects performed this in 3 sets for 10sec each. Also, the endurance was assessed using the same maneuver where subjects were asked to perform the maneuver for maximum duration.⁵

The strength was also assessed using the double leg lowering test (DLT) where the cuff was placed and inflated up to 40mmHg and the subjects were asked to slowly bring their legs down from 90 degrees till they lose control of the posterior pelvic tilt or a decrease of 10mmHg in the manometer.¹⁶

Also, the intensity of non specific low back pain was the other factor which was assessed using the VAS scale and ODI questionnaire where the total scoring was evaluated out of 50 and the percentage was calculated in the latter one.¹⁷

After assessing the two variables, they were prescribed a 4-week of core stabilization exercise program.¹⁵

Assessments:

The outcome variables were measured before the treatment session and after the 4 week of exercise protocol. The strength and endurance were assessed using the Chattanooga pressure cuff biofeedback and DLL test was another factor used to assess the strength to create more validity. ODI questionnaire and VAS scale were used to measure the intensity of non specific low back pain.

DATA ANALYSIS

MS Excel 2013 (15.0.4420.1017) was used to analyze the data. The measurements for strength, endurance and intensity of low back pain before and after the exercise protocol were compared using the paired t-test.

RESULTS:

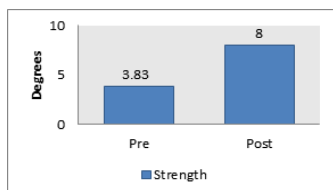
A total of 30 clinical physiotherapists participated in this study that had a work experience for more than 1 year in this work field. Result showed a significant improvement in strength and endurance of abdominal muscles. Both the variables showed improvement to almost twice the pre intervention value.

Table 1:

Column 1	Pre	Post
Strength	3.83	8
Endurance	22.63	47.6

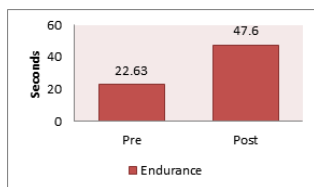
Pre and post intervention values

Figure1:



Comparison of strength values pre and post intervention

Figure2:



Comparison of endurance values pre and post the intervention

DISCUSSION:

The study in the recent times has shown improvement in strength and endurance after a minimum of 6 weeks of intervention. Whereas, in this study, both the variables showed significant improvement after a 4 week of core stabilization exercise protocol. In a study done by D. Malarvizhi et al (2017)⁽¹⁾ on 210 clinical physiotherapists showed that They are prone to musculoskeletal disorders due to their work profile which included lifting heavy patients, handling and transferring them. All of this contributes to low back pain.

In the study done by Rajan Balakrishnan¹⁸ et al (2016) showed that the performance on Swiss ball leads to greater activation of muscles as compared to stable surface. Hence, this study shows that a 4-week of protocol is significant in improving the core strength and endurance.

Also, in one of the studies done by Sobhy M Aly (2017)¹⁹ concluded that core stability exercises are beneficial in improving the strength and endurance of trunk muscles when compared to dynamic strengthening exercise program in subjects with low back pain.

This study assessed the core strength and endurance among clinical physiotherapists which showed poor results. Hence, a protocol was designed for 4 weeks after which they showed encouraging and drastic improvement. Considering the values of post intervention, the mean strength reached to 8 which initially was 3.83. Similarly, the mean endurance reached to 47.6 which initially was 22.63. Thus, the result shows that the core stability exercise protocol helped in improving the

strength and endurance of abdominal muscles' to almost twice when compared to pre intervention values.

After the completion of this exercise protocol, they also reported decrease in their low back pain and thus, making them more aware of their postures especially during working hours.

In conclusion, we can say that 4 weeks of core stabilization exercise protocol shows significant improvement in both strength and endurance of abdominal muscles.

LIMITATIONS:

1. The sample size taken was small.
2. There is no separation done between male and female physiotherapists.
3. There was no quantitative comparison done to find out the effect of each exercise on isolated muscles to acknowledge which exercise gives better results in improving the strength and endurance.
4. The compressive & shear loading weren't measured on the spine during the task.

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