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A Study on Effectiveness of Swiss Ball Exercise and Pilates Exercise Along with Interferential Therapy for Core Muscle Strengthening on Chronic Low Back Pain Among College Student – A Comparative Study

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Abstract
Background of The Study: Chronic low back pain is defined as pain in the lower back that persistes for more than 12 weeks. Core stability is the ability to control the position and movement of the trunk over the pelvis to allow optimum production, transfer and control of force and movement to the terminal segment.
Aim of The Study: To compare the effectiveness of swiss ball exercise and pilates exercise along with interferential therapy for core muscle strengthening on chronic low back pain among college student.
Methodology: This study consists of 30 females between the age group of 18 to 25 years. They were allocated into two groups. Each group contains 15 members. Group A received Swiss ball ecercise along with interferential therapy and Group B receives Pilates along with interferential therapy for 4 sessions per week which is conducted for about 6 weeks. The outcome measure is NPRS, Double leg lowering test, Oswestry disability questionnaire.
Result: The mean value of NPRS in group A (4.066) is more than the NPRS in group B (2.066) and ODI in group A (28.393) is more than the ODI in group B (23.660). The mean value of DLLT in group A (56.66) is more than the group B (50.933).
Conclusion: This study concluded that both swiss ball exercise and pilates exercise strengthen the core and reduce low back pain, but pilates exercise is much more effective than swiss ball exercise.

Keywords: Low back pain, Swiss ball, Pilates, Interferential therapy

Introduction
Chronic low back pain (CLBP) is a common musculoskeletal condition that can significantly impact an individual's quality of life and daily functioning [1]. The core muscles, which are the primary muscle group for maintaining spinal stability, can be divided into two groups according to their functions and attribute s.the first group of muscles is composed of the deep core muscles, also called stabilizing muscles. The second group of muscles comprises the shallow core muscles, which are also known as global stabilizing muscles. When the core muscles function normaly, they can maintain segmental stability, protect the spine, and reduce the stress impacting the lumbar vertebrae and intervertebral discs [2].

Prevalence
The prevalence of Chronic low back pain in the general population ranges from 4.2% to 80.2%. The prevalence can vary based on factors such as age, gender, occupation and geographical region. 619 million people globally were affected by Chronic low back pain in 2020 according to WHO and this number is expected to increase up to 823 million by year 2050. Current research indicates that around 79% of Indian women aged 20 to 50 years' experience some form of chronic pain, with Chronic low back pain being one of the most commonly reported forms. Specifically, the prevalence of Chronic low back pain among women stands at around 80%, in comparison to 59% among men [1].

Core Stability
Core stability is defined as the ability to control the position and movement of the trunk over the pelvis to allow optimum position, transfer and control of force and movement to the terminal segment. Core is used to stabilize the thorax and the pelvis during dynamic movement [3]. Core strength is also very important to improve body balance and postural control in movements such as landing and contact [4].

Swiss Ball
The "Swiss ball" was coined because one of the earliest noted uses of an exercise ball was 1965 in Switzerland where a group of physical therapists used it in their work with children with cerebral palsy. The exercise ball may be referred to as gymnast ball, stability ball, physio ball. The swiss ball is widely used in the recreational training environment to be a device for core stability exercise. The swiss ball is a conservative treatment option for back pain sufferers and is designed to help prevent further episodes of low back pain as part of a rehabilitation programme [5]

Pilates
Pilates was developed in the 1920s by joseph pilates and consist of comprehensive body conditioning, which aims to develop better body awareness and improve posture. Pilates exercises mainly involve isometircs contractions of the core muscles, responsible for the stabilization of the spine, both

while moving or at rest. The reported benefits of pilates exercise include improvements in strength, range of motion, coordination, balance, muscle symmetry, flexibility, proprioception (awareness of posture), body definition, and general health [6].

Outcome Measures

Numerical Pain Rating Scale

The numerical pain rating scale (NPRS) is a subjective measure in which individuals rate their pain on eleven-point numerical scale. The scale is composed of 0 (no pain at all) to 10(worst imaginable pain) [10].

Oswestry Disability Index

The Oswestry disability index (ODI) is a patient completed questionnaire which gives a subjective percentage score of level of function(disability) in activities of daily living in those rehabilitating from low back pain. It was developed by Jeremy Fairbank and Graham Pynsent in Oswestry, England in 1980 [9].

Double Leg Lowering Test

Lie supine with hands across chest, with knee bent, bend hips to 90 degrees and extend knee. The examiner places fingertips, or a blood pressure cuff (inflated to 40 mm Hg) underneath the lower back. Participants maintain pressure on the blood pressure cuff or the examiner's fingertips by contracting abdominal muscles as they lower their legs. The test is terminated if the pressure is decreased, and the angle is recorded [4].

Methodology

This study consist of 30 females were selected under the inclusion criteria between the age group of 18 to 25 years. 30 subjects were allocated in to two groups (Group A and Group B). Each group contains 15 members. Individual in the Group A receives Swissball exercise along with interferential therapy and Group B receives Pilates exercise along with interferential therapy for 30 minutes per day, 4 sessions per week. The total duration of the study is conducted for 6 weeks. The inclusion criterias are Patient only with mild to moderate low back pain, Only Female subjects are included, Patient with core muscle weakness, Patient without neurological symptoms, Patient without deformity, Patient who can able to perform exercises, Patient without radiating pain and the exclusion criterias are Patients with Severe back pain, Disc herniation, Tumor, Infection, Fracture, Osteophorosis, Structural deformity,Inflammatory disorder, Soft tissue injuries,recent back surgeries and recent abdominal surgeries.

Informed consent form was given to all subjects for receiving permission to participate in the study.

GROUP A treated with swiss ball exercise with Interferential therapy. They are,

Dolphin plank

Place your elbows on the top of a swiss ball in prone position with legs extended. Keep back straight and hold this position for 5 to 10 seconds. Repeat it for 10 times [3].

Bridge

Lie on your back with your legs resting on the top of the ball, tighten your abdominal muscle. Raise your hip and buttocks off the floor in to a bridge and hold for 3 deep breaths. This works your core muscles and the muscles along your back side, the gluteus muscle and hamstrings as they contract to keep you in place. Return to the starting position. Moreover, repeat for 10 times [3].

Plank

Ask the patient to lie on the swiss ball in prone position lean forward until you touch the floor with your hands with elbow extended and both the legs on the top of the ball. Move your hands forward away from the ball until the ball reach your upper thighs, tighten your abdominal muscles. Move your hands backward. Repeat for 10 times [3].

Stability Ball Crunch

Lie on the back, with knee flexed feet on floor hip width apart and hands behind ears. Slowly start with upper body upward raising shoulders off ball and tucking chin to chest. Maintain the position for 5-10 seconds. Repeat it for 10 times [3].

GROUP B treated with pilates exercise with Interferential therapy. They are,

Hundreds

Lie face up, bring knee in towards chest and lift head, neck and shoulders off the mat, and stretch hands by sides with palm facing floor. Pump arms up and down while breathing in and out through the nose for five counts each. Hold the position and continue for 10 beats. Repeat for 10 times [3].

Single Leg Stretches

Lie in supine position on mat with knees drawn towards chest, shins parallel to floor in table-top position. At the same time extend left leg straight to a 45- degree angle and drawn right knee towards chest. Patient will maintain the upper body lift throughout the exercise. In addition, it will support the abdominals. Repeat for 10 times [3].

Double Leg Stretches

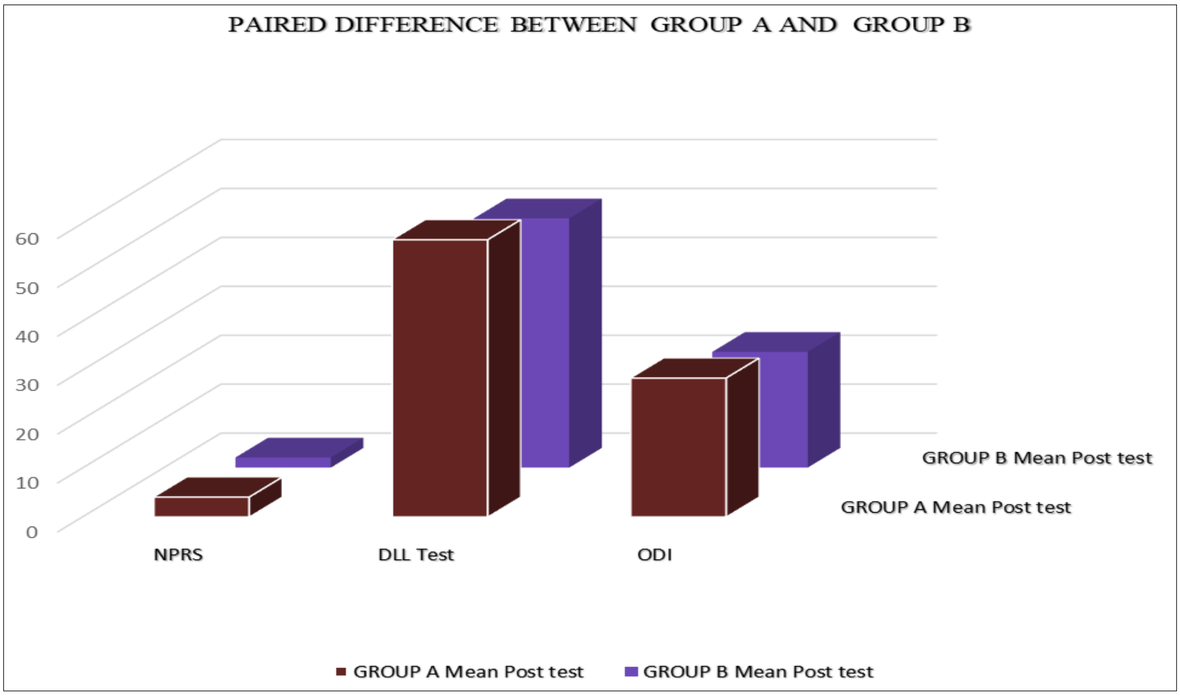
Lie face up on mat. Raise the head, neck, and shoulders and bring knees to chest arms hugging shins. Inhale and straighten leg to a 45 angle while at the same time extending arms along ears. Keep shoulders off the mat and maintain breathing. Maintain the position for 5 to 10 second. Repeat for 10 times [3].

Double straight leg stretches

Lie in supine position on mat with hands supporting back of neck and knees bend towards chest. Exhale bringing upper torso off mat and extending legs towards ceiling. Maintain the legs to a 45-degree angle for 3 counts then lift again for 1 count remain in the position to maintain the core strength torso position throughout exercise. Repeat the exercise 10 times [3].

Result

The mean value of NPRS in group A (4.066) is more than the NPRS in group B (2.066) and ODI in group A (28.393) is more than the ODI in group B (23.660). The mean value of DLLT in group A (56.66) is more than the DLLT in group B (50.933).



Discussion

In this present study, 30 samples were included. The purpose of the study is to analyze and compare the effects of Swissball exercise and Pilates exercise for core muscle strengthening on chronic low back pain. This study has done the exercise programme for 6weeks, 30 samples were divided into 2 groups of 15 participants.

Swissball exercises target deep core muscles, improving stability and balnce which can reduce pain and enhance spinal alignment. These exercises are dynamic and engage multiple muscle groups. Pilates exercises focuses on controlled movements, improving core strength, flexibility and posture. It has been shown to reduce pain and enhance spinal mechanics.

Christopher *et al*., showed that the effects of pilates exercise programme on core muscle strength in females found no difference between the groups [9].

Kamatchi *et al*., concluded that pilates exercise was effective on core muscle strengthening [3].

Recommendations

1. Sample of this study design was small and it can be done on bigger samples.
2. The future studies could explore the long-term effects of these exercises on CLBP.
3. Use of more reliable scale.

Conclusion

From this study it was concluded that both the swissball exercise and pilates exercises were effectively strengthen the core muscle of the participants which reduces the chronic low back pain. But when compared to Group B (Pilates exercise) showed much difference than Group A (Swissball exercise) in strengthening core mucles and reducing chronic low back pain.

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