COMPARATIVE STUDY ON THE PILATES AND EGOSCUE EXERCISE FOR CORE MUSCLE STRENGTHENING AND POSTURAL CORRECTION TO BICYCLE RIDERS WITH LOWBACK PAIN AMONG SCHOOL STUDENTS

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KEYWORDS

Pilates, Egoscue, low back pain

ABSTRACT

Background: Low back pain is a pervasive and debilitating condition affecting millions of individuals worldwide, particularly among school going students. The prevalence of LBP among school-aged children has been reported to range from 30% to 60% **Purpose Of The Study:** To compare the effectiveness of Pilates and Egoscue exercise for core muscles strengthening and postural correction to bicycle riders with low back pain among school students. **Aim:** To compare the effectiveness of Pilates and Egoscue exercise for core muscles strengthening and postural correction to bicycle riders with low back pain. **Methods:** A total of 40 subjects were randomly assigned to Group A and B. Group A performed Pilates exercise. Group B performed egoscue exercise. 4 sessions per week of 4 weeks of duration. **Conclusion:** the study concluded that Pilates Exercise reduces pain and increases functional ability then Egoscue exercise among the school student with Low Back Pain in Bicycle Riders.

INTRODUCTION

Low back pain is a pervasive issue affecting millions of individuals worldwide, particularly among adolescents who engage in regular physical activities such as cycling. Bicycle riding, while beneficial for cardiovascular health and fitness, can exacerbate LBP due to prolonged periods of sitting, poor posture, and repetitive motion. School students who ride bicycles regularly are especially vulnerable to which can impact their academic performance, mental well-being, and overall quality of life.

Low back pain is reported by more than half of cyclists.[1]. In cycling, both traumatic and nontraumatic (overuse) injuries are equally common, [2] with approximately 23 million cyclists experiencing at least one overuse injury in their lifetime. [3, 4, 5] Overuse injuries account for the majority (51.5%) of cycling-related injuries reported over a four-year period [2, 6] and low back pain (LBP) is the most prevalent among these injuries. People of all ages experience non-specific low back pain, which is the most common cause of illness worldwide. Fifty to eighty percent of normal and healthy individuals will at some point in their lives experience low back discomfort, with the lumber area accounting for eighty percent of these cases[7].

There is a dearth of study on the aetiology of LBP in cyclists in addition to the scant epidemiology of the condition. LBP in cyclists. The cyclist's goal is to push the bicycle ahead with as much power as possible at the pedals.1. The cyclist needs to minimize aerodynamic resistance in order to maximize speed. This is accomplished by keeping the hips and spine in a flexed position. Since this extended flexed posture may put the posterior active and passive spinal structures under more stress and strain, it may be a significant contributing factor to the development of lower back pain in cyclists [8]

Pain that occurs posteriorly in the region between the lower rib margin and the proximal thighs.[9] During cycling, cyclists adopt various positions to achieve proper aerodynamics and increase speed and efficiency, including flexion of the lumbar spine. [10, 11, 12] The flexed spinal position commonly used by cyclists alters the natural angle between the vertebrae, resulting in changes in spinal loading. [12] Sustained or repeated lumbar flexion is associated with LBP, [13, 14, 15] and the term "flexion pattern complaint" describes the positional changes that occur in conjunction with nontraumatic LBP [16, 17]. Core stability is crucial for developing cycling power. [18, 12]

The settings of bicycle components affect spinal position during cycling, which in turn affects cycling efficiency. [19] Therefore, altered spinal kinematics or patterns of core muscle activation, combined with the repetitive nature of cycling, can lead to overuse injuries in the lumbar region. Several mechanisms have been proposed to explain the Patho mechanics of LBP in cyclists, including mechanical creep (a distortion or strain of ligaments that occurs with constant loading), disc ischemia, muscle fatigue, and over activation of back extensors. Another phenomenon is the flexion-relaxation phenomenon, in which the erector spinae and multifidus muscles deactivate with a flexed spine, causing increased loading on the passive structures of

the spine, such as intervertebral discs and ligaments. [20, 21, 4] Several risk factors are associated with LBP in cyclists, including muscle activation asymmetries, flexibility, and bicycle fit, and training volume. [4, 22]Among these risk factors, bicycle fit has the strongest relationship with LBP in cyclists [23, 24, 4] In recent years, exercise-based interventions have gained popularity as effective management strategies for low back pain. Pilates and Egoscue exercises have shown promise in strengthening core muscles and improving posture. Pilates focuses on building core strength, flexibility, and body control, while Egoscue exercises target postural correction and muscle balance.

This comparative study aims to investigate the efficacy of Pilates and Egoscue exercises in alleviating Low back pain, strengthening core muscles, and improving posture among bicycle-riding school students. By examining the outcomes of these two exercise interventions, this research seeks to provide valuable insights for healthcare professionals, physical educators, and cycling enthusiasts, ultimately informing the development of targeted exercise programs to mitigate LBP in this population.

METHODOLOGY

It is a quasi-experimental study. This chapter deals with the methods used for this study. This includes information on subjects, protocol, procedure used in data collection and results of the data analysis. A sample of convenience of 20 subjects was taken. The subjects were randomly assigned to group A and B. The sample has been taken from school students. The study included within the age group of 15 to 20 years with back pain. And excluded the Subjects with spinal injuries, pots spine and who were uncooperative. Subjects with any musculoskeletal disorders, Neurological disorders, cardiovascular disorders. Any past spinal fractures were also been excluded.

STUDY PROCEDURE:

For all subject baseline measurements were taken on the first day. Weight and height were recorded on a bathroom weighing scale and Stadiometer. Each subject was asked to remove his shoes. The subject stood on bathroom weighing scale and distributed weight evenly on both feet and weight was recorded. Height was measured by Stadiometer. Each subject was asked to remove his shoes. The back of the head, back, buttocks, calves and heels were touching the wall. The feet were kept together. The subject was asked to look straight and height was recorded. Pain measurement was taken by visual analogue scale (vas) scale. Low Back pain was measured by Oswestry Low Back Pain Scale. Oswestry scale is a measurement of disability in patients with low back pain**.** Posture correction during cycling was prescribed for all the subjects in both groups which was followed by them for 4 weeks.

Group A

The group A performed Pilates exercise. exercise was done 4 days per week for 45 minutes per session in the morning. The session was preceded by a 10-minute warm-up and followed by a 5 minute cool down. The subjects were asked to do the exercise on a plain ground on a mat surface. Pilates exercise done are hundreds, single leg stretches, double leg stretches and double straight leg stretches continuously for 45 minutes. Hundreds exercise was done by Lie face up, bring knees in towards chest, lift the head, neck, and shoulders off the mat, and stretch hands by sides with palms facing the floor. Pump arms up and down while breathing in and out through the nose for five counts each. Single leg stretches Lie in a supine position on the mat with knees drawn towards the chest, shins parallel to the floor in a table-top position. At the same time, extend the left leg straight to a 45-degree angle and draw the right knee towards the chest. The patient will maintain the upper body lift throughout the exercise, which will also support the abdominals. Double leg stretches Lie face up on the mat. Raise the head, neck, and shoulders and bring the knees to the chest, with arms hugging the shins. Inhale and straighten the legs to a 45-degree angle while at the same time extending the arms along the ears. Keep the shoulders off the mat and maintain breathing. Maintain the position for 5 to 10 seconds and repeat 10 times. Repeat 10 times. Hold the position and continue for 10 beats. Double straight leg stretches Lie in a supine position on the mat with hands supporting the back of the neck and knees bent towards the chest. Exhale, bringing the upper torso off the mat and extending the legs towards the ceiling. Maintain the legs at a 45-degree angle for 3 counts, then lift again for 1 count. Remain in the position to maintain this core strength torso position throughout the exercise. Repeat the exercise 10 times. The outcome of Pain measurement was taken by visual analogue scale. Low Back pain was measured by Oswestry Low Back Pain Scale. The pre and post-test analysis is taken .

Group B

The group B performed egoscue exercise. exercise was done 4 days per week for 45 minutes per session in the morning. The session was preceded by a 10-minute warm-up and followed by a 5-minute cool down. The subjects were asked to do the exercise on a plain mat surface. Egoscue exercise done are Static back**,** Static Back with Abdominal Contraction, Static, Wall and Air Bench. Static back, The back and torso muscles are relaxed by gravity Lie down on your back with your legs propped up on the box (or chair) and your hands at 45 degrees. Breathe from your diaphragm. The abdominal muscles should rise as you inhale and fall as you exhale. Hold this position for five to ten minutes. STATIC WALL, place your legs vertically against the wall while lying on your back, creating a 90-degree angle. Keep your legs and buttocks as close to the wall as possible, with your feet hip-width apart, as long as your hips remain on the floor. As an additional variation, alternate bringing one leg off the wall by about 3 inches. Ensure that your foot is flexed and your thigh is tight. It is suggested to do 15 reps. AIR BENCH**,** stand with your back against a wall, with feet and knees hip-width apart and feet pointed straight. Walk your feet away from the wall while sliding your body down at the same

time. You will be "seated" in an invisible chair, with your knees bent. Your hips should be just slightly higher than your knees, and your ankles should be slightly ahead of your knees.
Your lower back should be completely flat against the wall. Your arms can hang down at your sides, or you can rest your hands gently on your lap. Hold this position as directed on your menu. Keep the weight in your heels and do not press forward onto your toes

TABLE:1 ANALYSIS OF NPRS (PRE-TEST) AMONG GROUP A AND GROUP B

GROUP	MEAN	SD	T-VALUE	P-VALUE
Group A (Pre)	4.85	1.14	0.4113	0.6832
Group B (pre)	5.00	1.77		

Group A and Group B , who participated in the 4-week Pilates exercise and egoscue exercise program, the pre- test mean score on the NPRS was 4.85 & 5.00 with a standard deviation of 1.14 & 1.77 , (t=0.4113, p= <0.6832).

GRAPH 1: GRAPHICAL ANALYSIS OF NPRS (PRE-TEST) AMONG GROUP A AND GROUP B

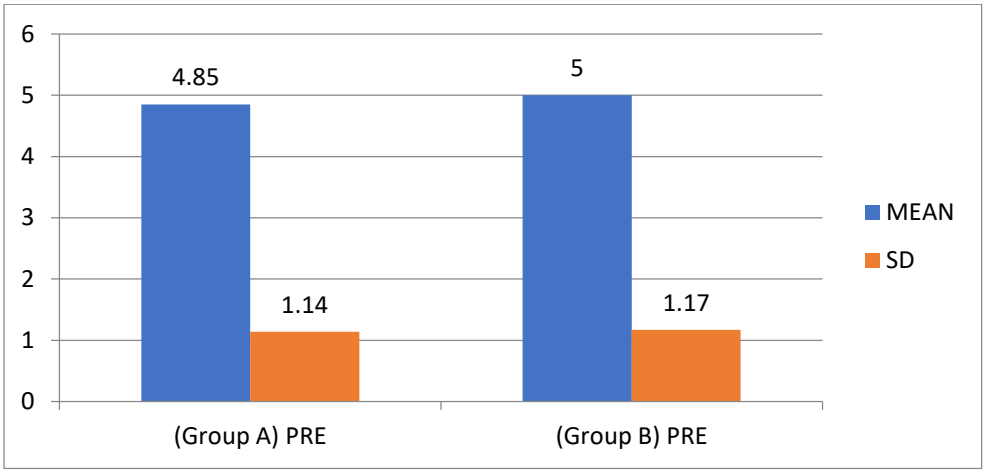


TABLE:2 ANALYSIS OF NPRS (POST-TEST) AMONG GROUP A AND GROUP B

GROUP	MEAN	SD	T-VALUE	P-VALUE
Group A (Post)	2.00	0.92	2.2680	0.0291
Group B (post)	2.70	1.03		

Group A and Group B , who participated in the 4-week Pilates exercise and egoscue exercise program, the post- test mean score on the NPRS was 2.00 & 2.70 with a standard deviation of 0.92 & 1.03 , (t=2.2680, p= <0.0291).

GRAPH 2: GRAPHICAL ANALYSIS OF NPRS (POST-TEST) AMONG GROUP A AND GROUP B

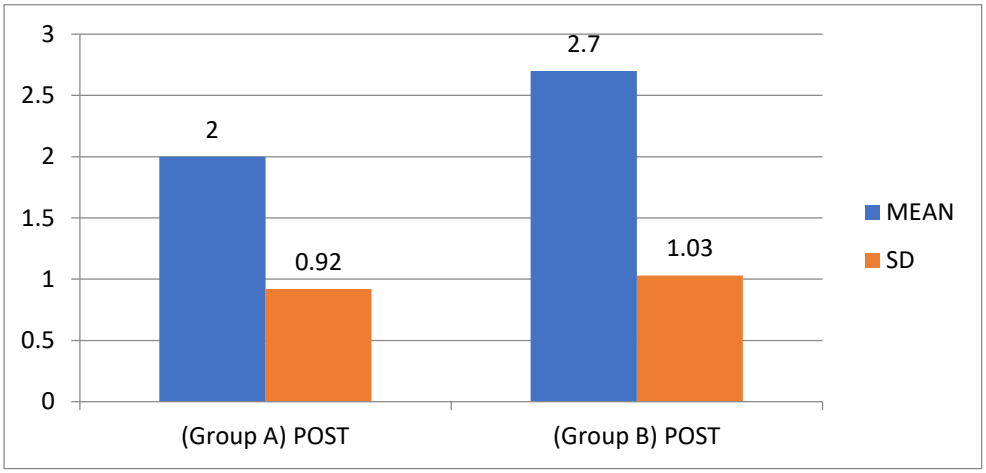


TABLE:3 ANALYSIS OF NPRS (PRE & POST-TEST) AMONG GROUP A

GROUP	MEAN	SD	T-VALUE	P-VALUE
Group A (Pre)	4.85	1.14	15.6825	0.0001
Group A (post)	2.00	1.92		

Group A , who participated in the 4-week Pilates exercise and egoscue exercise program, the pre- test mean score on the NPRS was 4.85 with a standard deviation of 1.14 and post- test mean score on the NPRS was 2.00 with a standard deviation of 1.92, (t=15.6825, p= <0.0001).

GRAPH 3: GRAPHICAL ANALYSIS OF NPRS (PRE & POST-TEST) AMONG GROUP A

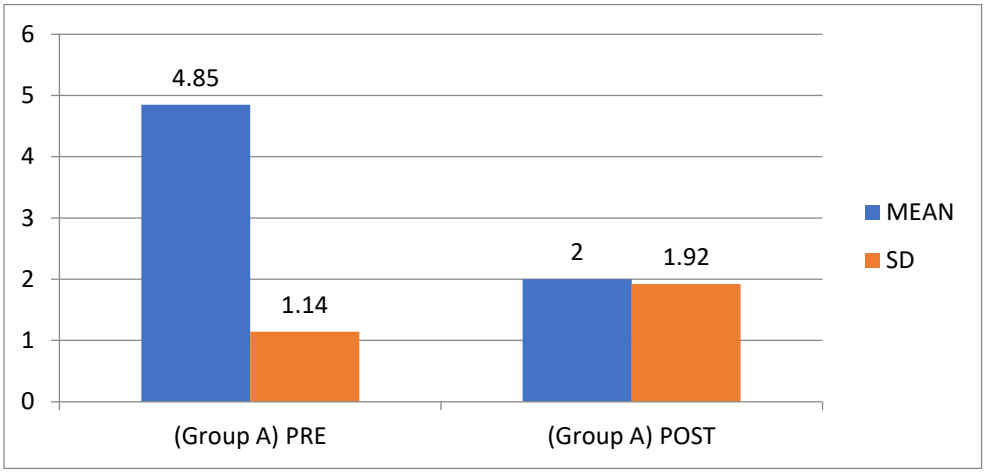


TABLE:4 ANALYSIS OF NPRS (PRE & POST-TEST) AMONG GROUP B

GROUP	MEAN	SD	T-VALUE	P-VALUE
Group B (Pre)	5.00	1.17	21.8714	0.0001
Group B (post)	2.70	1.03		

Group B, who participated in the 4-week Pilates exercise and egoscue exercise program, the pre- test mean score on the NPRS was 5.00 with a standard deviation of 1.17 and post- test mean score on the NPRS was 2.70 with a standard deviation of 1.03, (t=21.8714, p= <0.0001).

GRAPH 4: GRAPHICAL ANALYSIS OF NPRS (PRE & POST-TEST) AMONG GROUP B

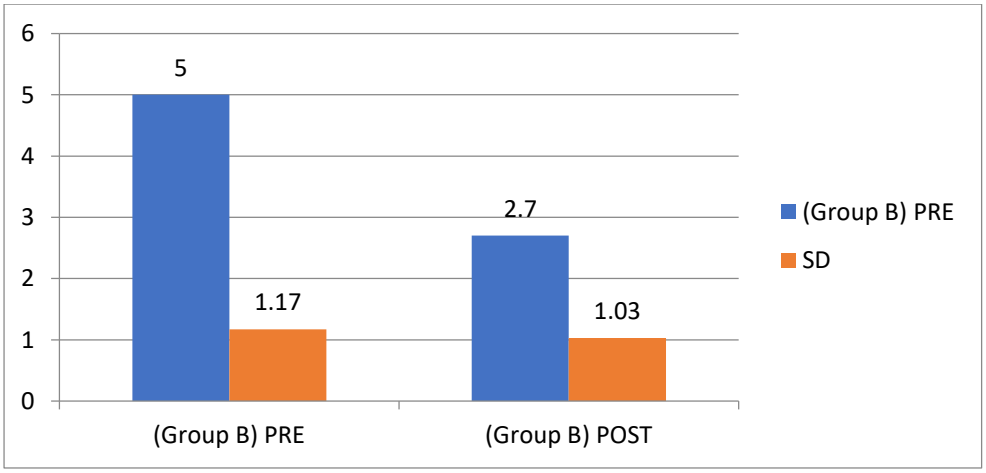


TABLE:5 ANALYSIS OF OSWESTRY DISABILITY SCALE (PRE-TEST) AMONG GROUP A AND GROUP B

GROUP	MEAN	SD	T-VALUE	P-VALUE
Group A (Pre)	18.80	4.90	0.1762	0.08611
Group B (pre)	18.50	5.81		

Group A and Group B , who participated in the 4-week Pilates exercise and egoscue exercise program, the pre- test mean score on the ODI was 18.80 & 18.50 with a standard deviation of 4.90 & 5.81 , (t=0.1762, p= <0.08611)

GRAPH 5: GRAPHICAL ANALYSIS OF OSWESTRY DISABILITY SCALE (PRE-TEST) AMONG GROUP A AND GROUP B

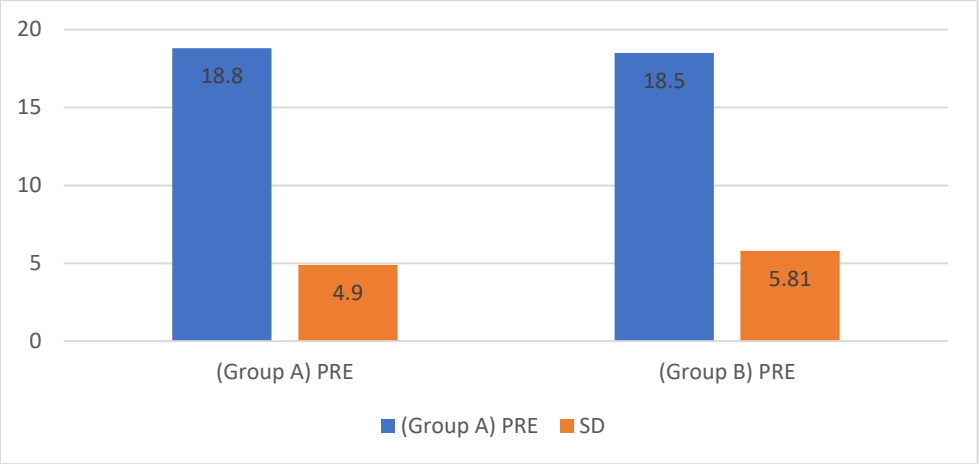


TABLE:6 ANALYSIS OF OSWESTRY DISABILITY SCALE (POST-TEST) AMONG GROUP A AND GROUP B

GROUP	MEAN	SD	T-VALUE	P-VALUE
Group A (Post)	11.80	4.87	1.6187	0.1371
Group B (post)	14.25	5.32		

Group A and Group B , who participated in the 4-week Pilates exercise and egoscue exercise program, the post- test mean score on the ODI was 11.80 & 14.25 with a standard deviation of 4.87 & 5.32, (t=1.6187, p= <0.1371).

GRAPH 2: GRAPHICAL ANALYSIS OF ODI (POST-TEST) AMONG GROUP A AND GROUP B

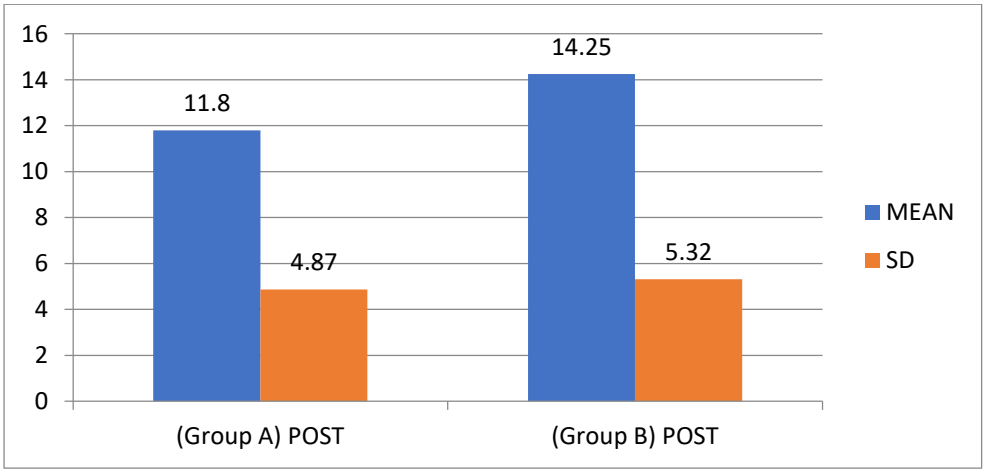


TABLE:7 ANALYSIS OF OSWESTRY DISABILITY SCALE (PRE & POST-TEST) AMONG GROUP A

GROUP	MEAN	SD	T-VALUE	P-VALUE
Group A (Pre)	18.80	4.93	11.7009	0.0001
Group A (post)	11.80	4.87		

Group A , who participated in the 4-week Pilates exercise and egoscue exercise program, the pre- test mean score on the ODI was 18.80 with a standard deviation of 4.93 and post- test mean score on the ODI was 11.80 with a standard deviation of 4.87, (t=11.7009, p= <0.0001).

GRAPH 3: GRAPHICAL ANALYSIS OF ODI (PRE & POST-TEST) AMONG GROUP A

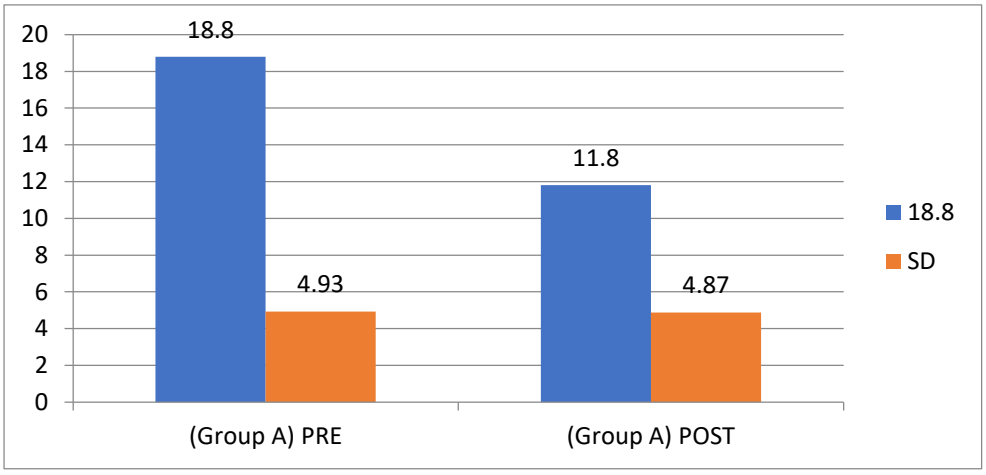
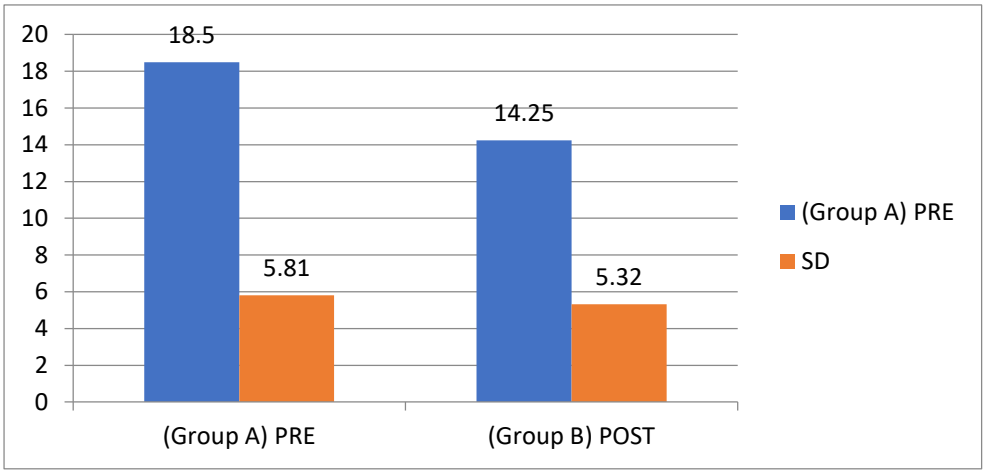


TABLE:8 ANALYSIS OF OSWESTRY DISABILITY SCALE (PRE & POST-TEST) AMONG GROUP B

GROUP	MEAN	SD	T-VALUE	P-VALUE
Group A (Pre)	18.50	5.81	5.5635	0.0001
Group B (post)	14.25	5.32		

Group B, who participated in the 4-week Pilates exercise and egoscue exercise program, the pre- test mean score on the ODI was 18.50 with a standard deviation of 5.81 and post- test mean score on the ODI was 14.25 with a standard deviation of 5.32, (t=5.5635, p= <0.0001).

GRAPH 4: GRAPHICAL ANALYSIS OF NPRS (PRE & POST-TEST) AMONG GROUP B



DISCUSSION:

The present study was done to compare the Pilates and egoscue exercise for core muscle strengthening and postural correction to bicycle riders with low back pain. The results showed that Pilates exercise is a better strategy to reduce low back pain compared to egoscue exercise. Pilates group Demonstrated greater improvements in core muscle strength and low back pain reduction compared to the Egoscue group. Egoscue group Showed superior postural correction and significant reductions in Low back pain frequency. Comparatively the Pilates exercises were more effective in strengthening core muscles, while Egoscue exercises excelled in postural correction. Various studies have showed that Pilates exercise alone, leads to reduction in low back pain. Pilates exercise is a popular and convenient form of physical activity that holds great promise for pain management. Approximately 23 million cyclists experiencing at least one overuse injury in their lifetime. Hundreds, single leg stretches, double leg stretches and doubles straight leg stretches Brisk walking is often recommended for low back pain persons because it increases the core muscle strength and reduce the low back pain. Core muscle strengthening: Consistent with studies by Cruz-Ferreira et al. 2011 and Olsson et al. 2015, Pilates exercises significantly improved core muscle strength in the present study. Low back pain reduction Similar to Segal et al.'s (2004) findings, Pilates exercises reduced low back pain intensity and frequency in the current study. In study done by Gisela c. Myamotoet al**,** He concluded that addition of Pilates exercise to an educational booklet provides benefits compared with education alone in patients chronic non-specific low back pain. However, the effects were not sustained overtime. Akuthota He concluded that physiologic functions of body are majorly supported by core, the treatment and prevention of various musculoskeletal conditions has theoretical basis of core strengthening. Postural correction In line with Egoscue's (1998) original work, the present study found Egoscue exercises to be effective in improving posture among bicycle-riding students. Low back pain management: Supporting the findings of Vrban et al. (2017), Egoscue exercises reduced LBP frequency in the current study.. Numerical pain scale rating is known to be the standard measure for pain. Also, Oswestry disability is a routinely used variable to identify Low back pain. It has been shown that

numerical pain scale rating and Oswestry disability scale independently contribute to the show the total pain and low back pain. So, the outcome measures used in this study are appropriate.

LIMITATIONS:

This study has some limitations such as only cycling school students were taken so the results cannot be generalized to the whole population. The study was for short duration so long-term effect of the exercise was missed out. Moreover, activities of daily living, except for exercise training, were not controlled.

CONCLUSION:

The study concludes that Pilates Exercise reduces pain and increases functional ability then Egoscue exercise among the student with Low Back Pain in Bicycle Riders

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