

Original Research Report

Effect of Core Stabilization Exercise for Non-Specific Low Back Pain among Athletes

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Abstract: This study aimed to analyze the effect of core stabilization exercise compared to general exercise for non-specific low back pain among athletes. There were 16 athletes with non-specific low back pain participated in this study. They were divided randomly into two groups after the screening process: core stabilization exercise group (CSG) and general exercise group (GEG). They were required to finish three sessions per week for six weeks. The pre-test and post-test were recorded using the Numeric Rating Scale (NRS) and Oswestry Low Back Pain Disability Questionnaire (ODQ). The study revealed that the core stabilization exercise group is influential and has significant pain relief ($p=0.000$) and disability reduced ($p=0.001$) compared to the general exercise group after six weeks of intervention. This study demonstrated that core stabilization exercise is effective in reducing pain relief and reduce functional disability. Thus, prescribing core stabilization exercise may be beneficial to be used as therapeutic exercises for patients who suffer low back pain as it relieves pain and reduces functional disability.

Keywords: Core Stabilization Exercise, Non-Specific Low Back Pain, Functional Disability, Spine.



1. Introduction

Low back pain (LBP) generally affecting the adult population, with a prevalence of up to 84% [1]. It influences specific functional activities about daily living [2] and notable deterioration in life quality [3]. Due to the cause it creates, the topic regarding scientific treatment for treating LBP becomes a widespread discussion amongst professional healthcare providers.

LBP categorize into specific or non-specific. All patients in the United States with back pain in primary care, 4% have a compression fracture, 3% spondylolisthesis, 0.7% a tumor or metastasis, 0.3% ankylosing spondylitis, and 0.01% an infection [4]. Non-specific low back pain is defined as symptoms without an exact specific cause: low back pain of unknown origin. 90% of all patients have non-specific low back pain, which diagnosis based on the exclusion of specific pathology [5]. Risk factors regarding LBP are mostly related to smoking behavior, sports participation, Body Mass Index (BMI), overall standing time, perceived stress level, and lifting heavy objects [6]. Triki et al. [7] show that 898 undergraduate students suffer LBP (14.8%), with females having the highest prevalence (17.6%) than in males (12.5%). Undergraduate also suffers LBP at one point in their life. Guidelines for LBP treatment recommend encouraging physical activity and exercise [8].

Physical fitness degree to which people have these attributes measured with specific tests, either health or skill-related [9]. Fitness and exercise could integrate with a clinical setting to treat numerous chronic diseases [10].

Generally, the core is referring to the lumbopelvic-hip complex [11]. The core's anatomical features contribute a stabilization effect on the trunk and spine region [12]. The stability controls the trunk's position and movement for optimal production, transfer, and control of forces to and from the upper and lower extremities during functional activities [13]. Its exercises have become a popular form of therapeutic exercise to restoring proper kinetic function [11]. Core stabilization exercises decrease pain, reduce disability, restore muscular function, promote stability, and reduce subsequent injury [14]. This study's purpose was to compare the effect of core stabilization exercise and general exercise among university athletes.

2. Methodology

2.1. Participants

Participation was voluntary, and a written consent form was obtained from all athletes. Participants recruited were 20 university athletes who complain of having Non-Specific Low Back Pain. All information acquired was treated with strict confidentiality. To participate in this study, the athletes must fulfill these following inclusion criteria with non-specific low back pain and normal BMI (18.5 – 24.9). The exclusion criterion was overweight BMI (more than 25), pregnant, wore implant/prosthesis, or undergone surgery.

2.2. Instruments

The researcher uses the Oswestry Disability Index for Low Back Pain and NRS during the pre-test and post-test to check the program's effectiveness. The 11-point numerical pain rating scale (NPRS) is a measure of pain ranging from 0 (no pain) to 10 (worst imaginable pain), which correlates with self-reported disability and physical activity level.

2.3. Procedure

The research was conducted by the flow of several steps of the procedure, as showed in Figure 1. Firstly, the research collect sample amongst university athletes. Next, the sample was screened with the exclusion and inclusion criteria before proceeding. They were divided randomly into two groups, the Core Stabilization Group (CSG) and the General Exercise Group (GEG). The acquired data for pre-test and post-test consists of NRS and the Oswestry Disability Index

Core Stabilization Exercise

They performed 3 out of 5 exercises for one session a day, three times a week.

Session 1: Plank, Deadbug & Bridge

Session 2: Bird-Dog, Left Side Plank, Right Side Plank

Session 3: Repeat session 1 exercise

Session 4: Repeat session 2 exercise

They rest for 30-60 seconds in between.

General Exercise

They performed 3 out of 5 exercises for one session a day, three times a week.

Session 1: Bodyweight Squat, Lunges (Left and Right)

Session 2: Push up, Hamstring Stretch, High Knee

Session 3: Repeat session 1 exercise

Session 4: Repeat session 2 exercise

They rest for 30-60 seconds in between.

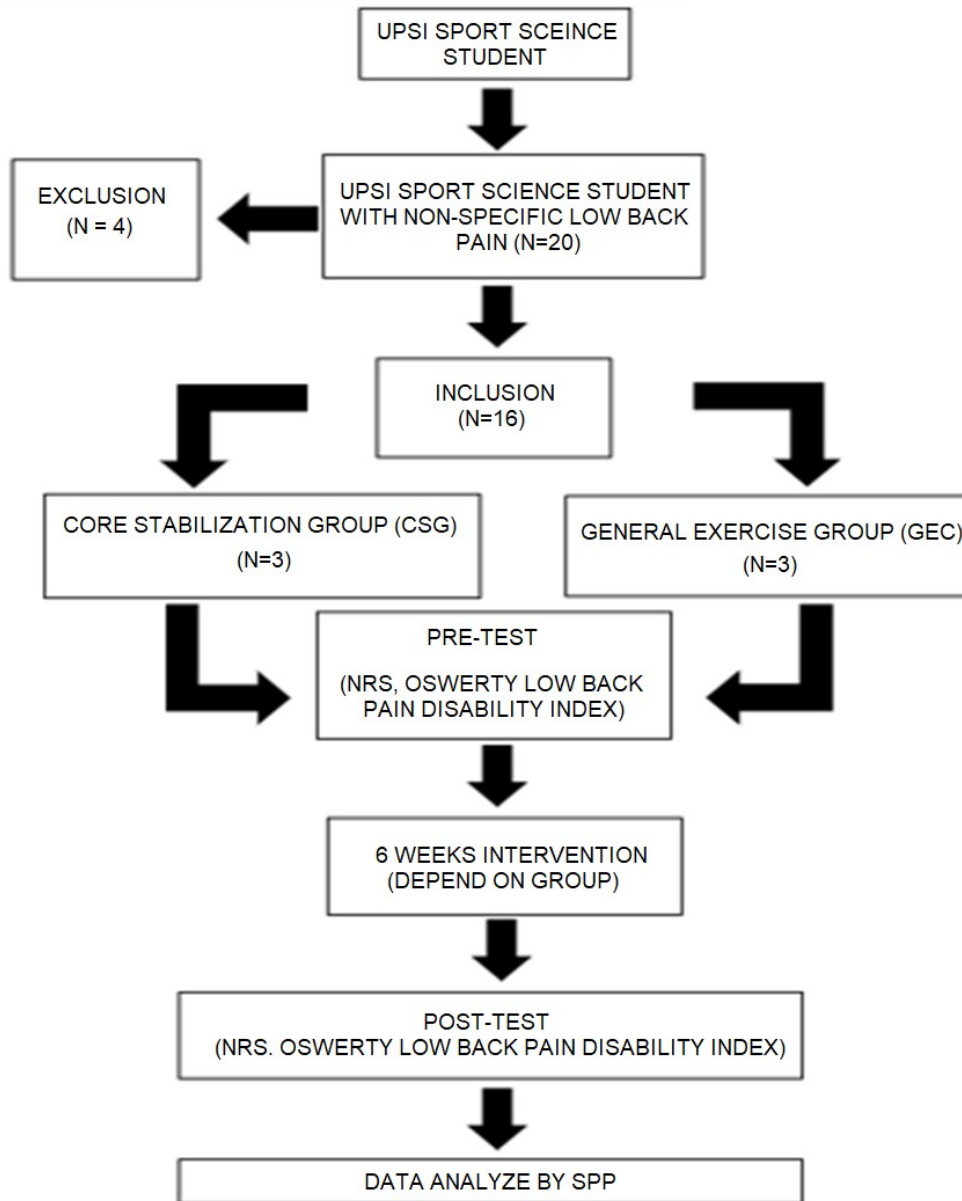


Figure 1. Research Framework

2.4. Statistical Analysis

The data acquired were then analyzed using the Statistical Package for Social Science package version 21.0. All analyses conducted were a two-tailed sample t-test with a significance level set at $p < 0.05$.

3. Results

3.1. Demographic Data

There was a total of 16 university athletes with non-specific low back pain involved in this study and asked to complete a questionnaire. The demographic data collected include age, gender, race, height, weight, and low back pain duration. The demographic data reported were divided into two groups: the core stabilization group (CSG) and the general exercise group (GEG). There were eleven males (68.75%) and five females (31.25%). The participant age, height, weight, BMI, and low back pain duration between CSG and GEG were similar, indicated that they were from the homogeneous group were presented in Table 1.

Table 1. Demographic Data

Variables	Core Stabilization Group (CSG) (n=8)	General Exercise Group (GEG) (n=8)
Age (years)	23.13 ± 1.13	23.50 ± 1.41
Height (cm)	168 ± 11.22	170 ± 11.53
Weight (kg)	63.62 ± 9.02	65 ± 8.56
BMI (kg/cm ²)	22.69 ± 1.16	22.18 ± 1.39

3.2. Effect in Non-Specific Low Back Pain after Intervention

The comparison between CSG and GEG in non-specific low back pain relief after six weeks of intervention is seen in Figure 2.

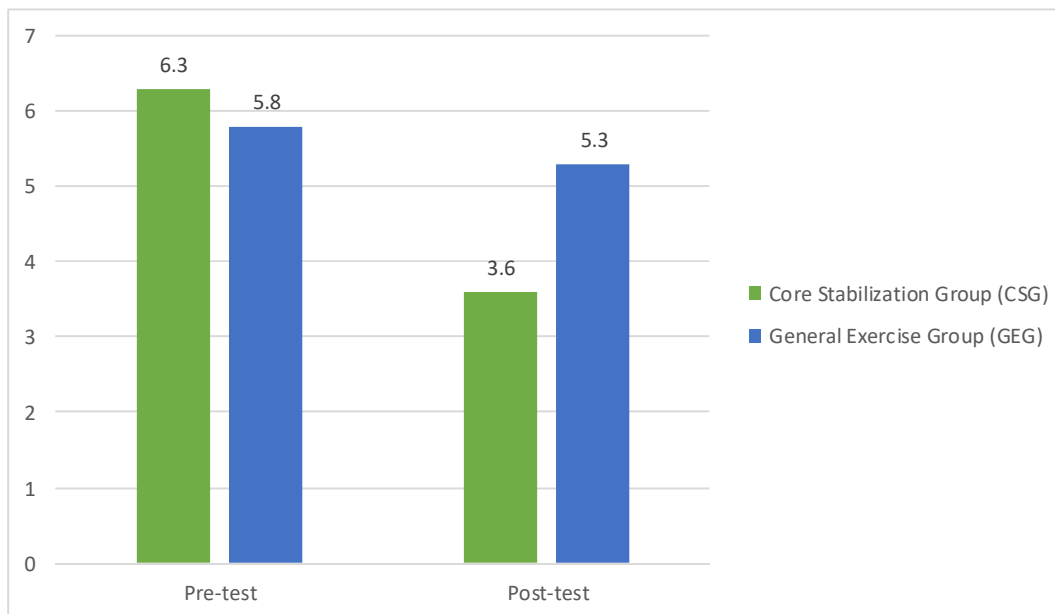


Figure 2. Effect in Non-Specific Low Back Pain

The pre-test value between CSG and GEG in low back pain intensity showed that these two groups are inhomogeneous groups before six weeks of intervention ($t = 0.654$, $p = 0.524$). After six weeks of intervention, there was a significant difference ($t = -4.478$, $p = 0.001$) between CSG and GEG, as shown in Table 2.

In terms of pain relief within the group, after six weeks of intervention, the mean NRS for CSG reading reduced from 6.375 to 3.625, while in GEG, the mean NRS reading is 5.250. There was significant change in pain relief after 6 weeks of intervention for CSG ($t = 4.885$, $p = 0.000^*$) while the GEG show no significant change ($t = 0.989$, $p = 0.340$).

Table 2. Comparison between Groups using Numeric Rating Scale

Group	Pre-test	Post-test	t	p
CSG	6.375 ± 1.408	3.625 ± 0.744	4.885	0.000*
GEG	5.875 ± 1.642	5.250 ± 0.707	0.989	0.340
t	0.654	-4.478		
p	0.524	0.001		

3.3. Effect in Disability Function after Intervention

The comparison between CSG and GEG in disability due to low back pain reduction after six weeks of intervention is seen in Figure 3.

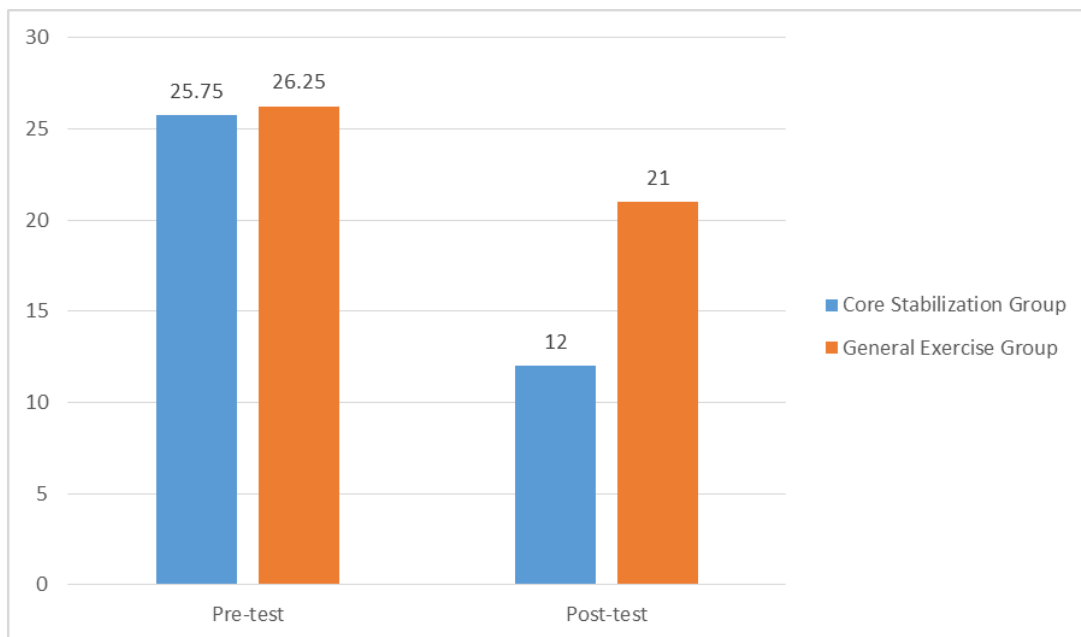


Figure 3. Effect in Disability Function

The Oswestry Disability Questionnaire (ODQ) was used to assess participant disability due to low back pain. Table 3 indicated the mean, standard deviation, t-value, and p-value of pre-test and post-test between CSG and GEG as well as within each study group. The pre-test value between CSG and GEG in disability due to low back pain showed that these two groups were from a homogeneous group before a six-week intervention ($t = -0.125$, $p = 0.902$).

After six weeks of intervention, there was a significant difference ($t = -3.225$, $p = 0.006$) between CSG and GEG, as shown in Table 3. In terms of disability reduced within-group, after six weeks intervention, the CSG group showed reducing disability from “moderate disability” (25.75 ± 8.58) to “minimal disability” (12.00 ± 4.14) while GEG showed slightly disability reduction from the mean (26.25 ± 7.36) to (21.50 ± 7.23). However, disability due to low back pain in ODQ still in the same “moderate disability” level. There was a significant change in disability reduction after six weeks of intervention in CSG.

Table 3. Comparison between Groups using Oswestry Disability Questionnaire

Group	Pre-test	Post-test	t	p
CSG	25.75 ± 8.58	12.00 ± 4.14	4.082	0.001
GEG	26.25 ± 7.36	21.50 ± 7.23	1.302	0.214
t	-0.125	-3.225		
p	0.902	0.006		

4. Discussion

The core stabilization exercise results of 18 sessions for six weeks effectively relieve low back pain, reducing functional disability due to low back pain on the athlete with non-specific low back pain than general exercise intervention. This result can be obtained by comparing the low back pain intensity and functional disability due to low back pain between the core stabilization and general exercise groups.

There was a highly significant difference between Core Stabilization Group (CSG) and General Exercise Group (GEG) in non-specific low back pain relief ($t = -4.478$, $p = 0.001$) after six weeks of intervention. Previous studies report that exercise for low back pain has evolved into a specific emphasis on maintaining spinal stability, aiming to improve neuromuscular control, endurance, and strength of muscles central to maintaining dynamic spinal stability [15]. The study compared core stabilization exercise and routine physical therapy to determine that CSG is more effective in terms of a more significant reduction in pain in non-specific low back pain. Areeudomwong [16] measured the effect of 10 weeks core stabilization program on pain presentation pattern, disability, and activation of trunk muscles. The control group was treated with stretching of the trunk muscles and hydro collar therapy, and the results indicated decreases in pain and disability.

This study revealed a significant difference between the core stabilization and general exercise groups in disability reduction ($t = -3.225$, $p = 0.006$) after six weeks of intervention. The effectiveness of core stabilization exercise in non-specific low back pain further reduces disability due to low back pain because pain affects the patient’s ability to manage their everyday activity, and evaluating the subjects’ disability level involves analyzing their ability to perform functional and occupational activities. Gatti et al. [17] affirmed that disability scale levels are primarily evaluated based on functional activities daily concern of LBP patients. A previous study by Sung [18] comparing two interventions between core stability exercise (CSE) and spinal flexibility exercise (SFE), found that the level of disability improved following the CSE intervention. Core stability is a primary component of functional movement, essential in daily living, and athletic activities. In an evaluation of functional movement, female collegiate athletes who scored 14 in Functional Movement Screening Tools or less

were four times prone to injury [19]. As a result, clinicians are continually challenged with best practices to assess and train core stability [11]. Thus, core stability is one of the primary components of functional movement, and it is essential for athletic activity and daily living.

5. Conclusion

This study concludes that core stabilization training effectively relieves non-specific low back pain and reduces functional disability due to low back pain. Hence, core stability exercise can be an option for fellow practitioners to prescribe exercise for patients with low back pain to reduce their pain level and improve their functional disability. This exercise can be used without equipment and body weight, making it a more comfortable alternative than using weights.

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