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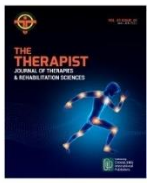

Original Article

Comparison of Core Stability Exercises with Williams' Flexion Exercises in Patients with Non-Specific low back pain

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Non-specific low back pain, low back pain, Core stability exercises, Williams' flexion exercises

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ABSTRACT

Low back pain is the most common complaint experienced by the majority of people at some point in their lifetime. Physical therapy has been in favor of effective treatment and prevention of low back pain. However, there is a lack of agreement on the best exercise treatment and abundant studies are in progress. Categorical studies are lacking particularly in this part of the world. This study was designed to compare the effectiveness and efficiency of two specific exercises, core stability exercises with Williams' flexion exercises, in patients with non-specific low back pain. **Objective:** The objective of this study was to find out the most effective treatment for patients with non-specific low back pain. **Methods:** This study is a single-blinded randomized clinical trial that was conducted in the physiotherapy outdoor patient department of the public hospital, Jinnah Hospital Lahore (JHL). 20 patients with non-specific low back pain were randomly allocated in two treatment groups, 10 in A (core stability exercises) and 10 in B (Williams' flexion exercises), after giving informed consent. The conventional treatment of low back pain. e.g., Hot or cold pack, electrotherapeutic modalities were given to the patients of both groups along with their specialized group treatment. The visual analog scale (VAS) and Modified Oswestry Low Back Pain Disability Questionnaire were used before treatment and after the third treatment session during the period of one to two weeks to measure outcomes. The independent samples T-test was used for data analysis. A P-value <0.05 was considered statistically significant **Results:** The results of this study illustrated that there is a significant difference between the two groups in clinical and therapeutic effect in the reduction of pain as the P-value is <0.05. While the results in the reduction of pain-related disability, measured by the Modified Oswestry Low Back Pain Disability Questionnaire, were not significant as P-value >0.05(P= 0.184). **Conclusions:** The study indicates that core stability exercises are more effective than Williams' flexion exercises for the reduction of non-specific low back pain except for a reduction in pain-related disability.

INTRODUCTION

Among health problems in the world, nonspecific low back pain is the most presenting complaint in musculoskeletal complaints [1,2]. The most common thought is that 5-10% of people develop chronic pain, the occurrence of chronic back pain [42-75%] and recurrence of back pain [24-84%] have been reported [3]. In different works of literature and articles, the prevalence of low back pain has been published several times [4,5]. Non-Specific Low Back Pain is a common disabling condition that affects not only a physical condition but also the psychological condition of the patient and is not caused by a serious pathology [6]. Non-specific low back pain is defined in a review of national guidelines as exclusion diagnosis, where the pain is caused by a suspected or definite severe pathology ('red flag' signs such as infection, tumor, or fracture) or presents as a radicular syndrome have been ruled out [7,8]. The diagnosis of Non-specific low back pain is made on the clinician being sure for not having any definite pathology [7,9]. The physical part of deconditioning involves both stiffnesses

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of the lumbar spine - pelvic- femoral unit, decreased muscle strength and endurance, loss of cardiorespiratory adjustment to physical exertion, and neuromuscular inhibition [10].

The sedentary lifestyle not only increases the fat content in the body but also causes progressive muscular weakness and causes decreased lumber core stability [5, 11]. The Non-specific low back pain with a tendency to reoccur, causes the absence from work for a varied duration, depending upon the condition of the person, with a resulting loss of productivity and efficiency, at last causing a great financial load on health systems also imposing great costs on society [12]. The decreased muscle power and of control abdominal and spinal muscles have been seen in people with Low Back Pain [13,14]. The atrophy and inactivation of the Multifidus muscle have also been seen in individuals with Low Back Pain [15,16]. The muscles of the trunk support vertebrae and the extensor muscles of the lower back maintain the dynamic control of moving segments [17]. Many systemic reviews in past years had elevated the significance of exercises to manage the Low Back Pain, with concrete evidence supporting a particular exercise; e.g., extension or flexion biased, McKenzie, Williams, Core stability [18,19]. Remain active and quick return to physical activities for quicker recovery with fewer to no associated disabilities [20]. Many different interventions and techniques are used to reduce pain and disability in patients with Low Back Pain, such as Injection, exercise, electrical and thermal modalities, manipulation, mobilization, acupuncture, and surgery [21].

The core stability exercises have been used to treat from 2003 to now [22,23]. The stabilization exercises are traditionally the most frequently prescribed exercises for pa patients with low back pain [24]. The core stability exercises are intended to develop and improve endurance, strength, and neuromuscular control to increase and maintain dynamic spinal stability. Lumbar multifidus, Para spinal muscles, transverse abdominis, abdominals, diaphragmatic, and pelvic musculature are directed in core stability exercises [25,26]. The core stability is no more effective than any other physical therapy exercise to reduce the chronic low back pain as weak abdominals, trunk muscles, and imbalance trunk muscle groups are not some pathological conditions but just a normal variation [27].

Williams flexion exercises also called Williams exercises was first published by Williams in his own modified exercise program in 1937 [28]. The Williams exercises include pelvic tilt, single knee to chest, double knee to chest, partial sit-up, Hamstring stretch, hip flexor stretch, and squat (Williams, 1937). The exercises with posterior pelvic tilt decrease the electromyography activity while standing exercises and anterior pelvic tilt increase it and electromyography activity of each level to different Williams' flexion exercises [29].

METHODS

The study was conducted in the physiotherapy outdoor patient department of a public hospital, Jinnah Hospital Lahore (JHL). The duration of the study was from August 2017 to January 2018 making a total time of 6 months after the approval of the synopsis.

This study was done by the randomized clinical trial study design This study was done double blindly. The patients and outcome assessors were blinded about the allocation of the groups. This study was done to know that which treatment is more effective and beneficial for a specific clinical problem. The study population included the patients having non-specific low back pain in the outpatient department of physical therapy in Jinnah Hospital Lahore. Sample size calculated from win Pepi: ver 11.0 with 90% confidence interval, 80 % power of the study, the ratio of sample size B: A 1, SD in Group A (Core) =.93 and in Group B (Williams) = .79 (from the study of Waseem et al) to detect a difference of .99. The required sample size was a Total = of 20 (10 in A, 10 in B). The sampling technique was a non-probability / purposive sampling technique but all participants were randomly assigned one of two treatment groups during research.

The patients with non-specific low back pain were included in this study. The patient should not have any signs of spinal tumors or metastases, recent fractures of the axial skeleton, inflammatory disease of the spine, progressive neurological defects, heart disease, recent abdominal surgery during the last two years, hip or knee endoprosthesis or metal implants, recent venous thrombosis, pregnancy, epilepsy, diabetes, chronic migraine, gallstone, renal stone, balance problem. The exclusion criteria of this study consist of Disc bulge or herniation at any level of the thoracic or lumbar spine, radiating pain down to the leg, neurogenic pain, referred pain, any pathological pain, age less than 15y and more than 70y. In this study to determine the level of pain and disability, before and after one of the treatments is given, were the Visual Analog Scale (VAS) and Modified Oswestry Low Back Pain Disability Questionnaire were used.

The VAS was used to measure the level of pain which is a reliable and valid measure of pain intensity and it is sensitive to clinical changes in pain [30]. A zero at the left end of the scale indicates no pain while 10 indicates the worst imaginable pain.

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A change of 1.1-1.2 cm indicates a minimal improvement, which is clinically significant [31]. The Modified Oswestry Low Back Pain Disability Questionnaire was used to measure the level of disability. A functional scale assessing the impact of low back pain on daily activities. The score is accounted by the summation of the values assigned for each of the 10 individual questions and is used to classify disability as mild or no disability (0- 20%); moderate disability (21%-40%); severe disability (41% to 60%); inability (61% to 80%); limited to bed (81% to100%) [32]. The sample of 20 patients was randomly allocated by coin method into two groups, Group A (core stabilization exercises group) and Group B (Williams flexion exercises group). Each group received 10 patients by random allocation. The conventional treatment of low back pain. e.g., Hot or cold packs, electrotherapeutic modalities were given to the patients of both groups along with their specialized group treatment. All exercises were done in the presence of a trained physical therapist. And the home plan was guided.

Core Stabilization Exercises Group:
The patients allocated to the core stabilization exercises group were managed by targeting the core muscles of the trunk. The core stabilization exercises include were: Bridging, Modified bridging, Frontal & Side Plank exercise, One arm superman, Modified superman & All fours superman, Abdominal crunch & lower abdominal exercises.

Williams' Flexion Exercises Group:
The patients allocated to Williams flexion exercises group were managed by stretching and strengthening of muscles of the back, abdomen, and leg by Williams' flexion exercises which includes: Pelvic tilt, Single knee to chest & double knee to chest, Partial sit-up, Hamstring stretch, Hip flexors stretch, Squat.

Data Collection Procedure:
The information regarding the nature of the study was given to all the participants and they were allowed to refuse from participating in the study. They were guaranteed that their personal information and identity will be kept confidential. They have assured the treatment given is evidentially proven. The questionnaire, consisting of a VAS and a modified Oswestry low back pain disability questionnaire, was filled out before treatment and after the 3rd treatment session during the period of one to two weeks.

Data Analysis:
Data cleaning was performed to ensure completeness of data by double entering. The Statistical Package for Social Services (SPSS) version 25.0 was used to analyse the gathered data. Statistical significance was set at P = 0.05. Descriptive statistics were employed to summarize the demographic data of the sample and presented in the form of tables and figures. Categorical variables were expressed as frequency and percentages. Continuous variables were expressed as mean, standard deviation. The independent samples T-test was used to compare means.

Ethical considerations:
Informed written consent was obtained from every participant. The participants were informed of their rights to withdraw from the study at any stage without prejudice. The participants were assured that all information given, would be kept confidential. The questionnaire was anonymously coded and only accessed by the researchers. Information obtained from the participants was for the study only and was handled with confidentiality. All the treatments applied are evidentially based proven.

RESULTS
The data were normally distributed at the baseline. Shapiro-Wilk test was used to assess the normality of data. The mean of group A is (32.90) and the stander deviation is (13.059) with a minimum age of 20y and a maximum of 57y. While the mean of group B is (35.70) and the stander deviation is (17.474) with a minimum age of 16y and a maximum of 66y. The total number of participants included in the study was 20 (13 male, 7female) with 65% male and 35% female, 10 participants (7 male, 3female) in group A (core stabilization exercises group), and 10 participants (6 male, 4 female) in group B (Williams' flexion exercises group). The percent of group A is male 70%, female 30%. While the percentage of group B is (male 60%, female40%).

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Q: Point out your level of pain in the following line:

As shown in Table 1 total number of participants included in the study was 20, 10 participants in group A (core stabilization exercises group) and 10 participants in group B (Williams' flexion exercises group). The mean and stander deviation is of group A pre-treatment is (4.56, 2.041) and post-treatment is (2.29, 1.975). While the mean and stander deviation of group B pre-treatment is (6.94, 2.200) and post-treatment is (4.60, 2.573). The test value is T= -2.508 and P value is 0.022. This result is significant as the P value is < 0.05.

Group Statistics					
	Group	N	Mean	Std. Deviation	T-test p-value
Pre-Treatment Point out your level of pain at the following line	Core Stability Exercises	10	4.56	2.041	T= - 2.508 P=0.022
	Williams Flexion Exercises	10	6.94	2.200	
Post-Treatment Point out your level of pain at the following line	Core Stability Exercises	10	2.29	1.975	
	Williams Flexion Exercises	10	4.60	2.573	

Table 1: Point out your level of pain at the following line

Visual Analog Scale:

As shown in Table 3 total number of participants included in the study was 20, 10 participants in group A (core stabilization exercises group) and 10 participants in group B (Williams' flexion exercises group). The mean and stander deviation is of group A pre-treatment is (4.20, 1.751) and post-treatment is (2.00, 2.108). While the mean and stander deviation of group B pre-treatment is (6.20, 2.201) and post-treatment is (4.00, 2.494). The test value is T= -2.249 and P value is 0.037. This result is significant as the P value is < 0.05.

Group Statistics					
	Group	N	Mean	Std. Deviation	T-test p-value
Pre-Treatment Visual Analog Scale	Core Stability Exercises	10	4.20	1.751	T= - 2.249 P=0.037
	Williams Flexion Exercises	10	6.20	2.201	
Post-Treatment Visual Analog Scale	Core Stability Exercises	10	2.00	2.108	
	Williams Flexion Exercises	10	4.00	2.494	

Table 2: Visual Analog Scale

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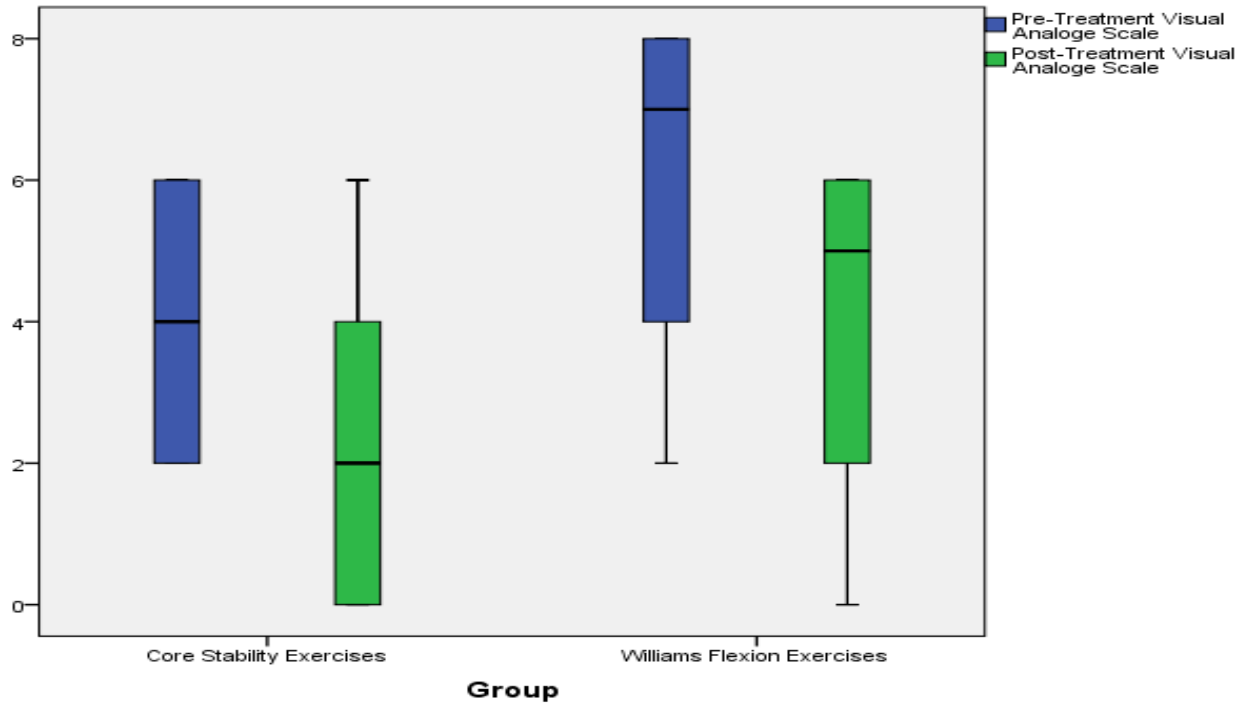

Figure 2: Visual Analog Scale

Modified Oswestry Low Back Pain Disability Questionnaire Score:

Modified Oswestry Low Back Pain Disability Questionnaire Score as shown in Table 5 total number of participants included in the study was 20, 10 participants in group A (core stabilization exercises group) and 10 participants in group B (Williams' flexion exercises group). The mean and stander deviation were of group A pre-treatment is (31.30, 20.602) and post-treatment is (20.60, 19.665). While the mean and stander deviation of group B pre-treatment is (42.20, 14.093) and post-treatment is (25.20, 15.383). The test value is T= -1.381 and the P-value is 0.184. This result is not significant as the P-value is >0.05.

	Group	N	Mean	Std. Deviation	T-test p-value
Pre-Treatment Modified Oswestry Low Back Pain Disability Questionnaire Score	Core Stability Exercises	10	31.30	20.602	T= -1.381 P=0.184
	Williams Flexion Exercises	10	42.20	14.093	
Post-Treatment Modified Oswestry Low Back Pain Disability Questionnaire Score	Core Stability Exercises	10	20.60	19.665	
	Williams Flexion Exercises	10	25.20	15.383	

Table 3: Modified Oswestry Low Back Pain Disability Questionnaire Score Group Statistics

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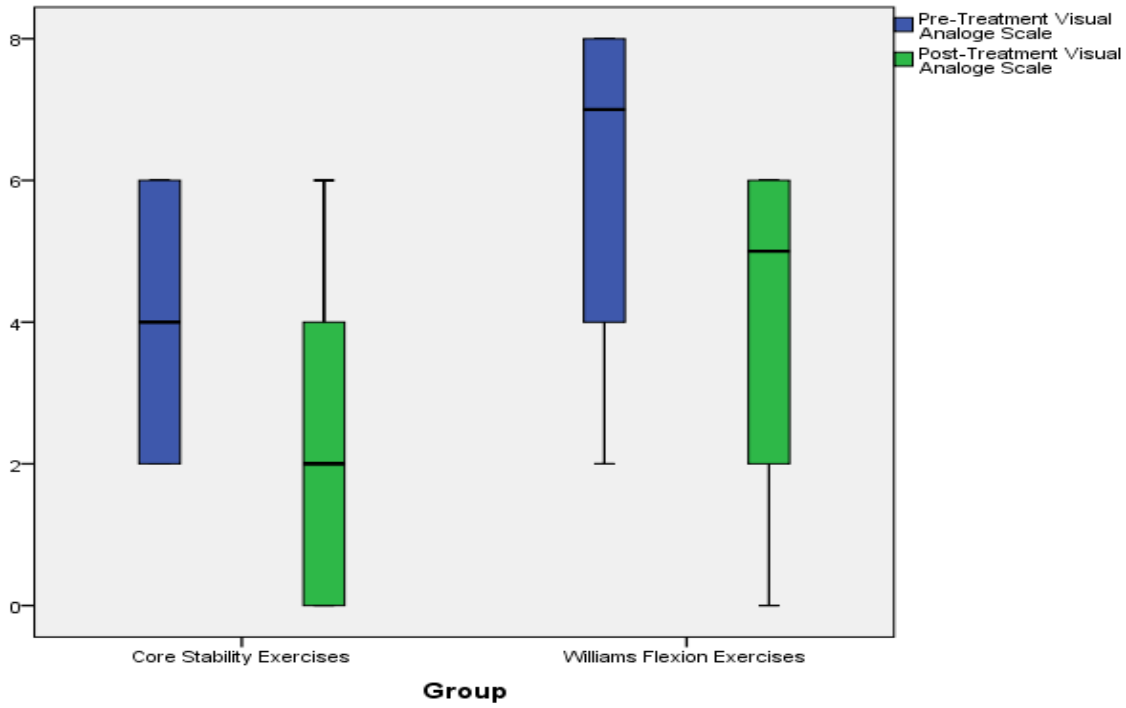

Figure 3: Modified Oswestry Low Back Pain Disability Questionnaire Score

DISCUSSION

The main purpose of this study was to determine the more effective treatment for the management of non-specific low back pain by comparing two treatment methods commonly used for its treatment by most physical therapists. The literature indicated functional instability as a major character in LBP. According to literature, stability of the lumbar intervertebral segments is not only provided by osseous and ligamentous restraints, but also by precise neural input and output referred to as neuromuscular control [4]. The study explored the significant effectiveness of core stability exercises over Williams' flexion exercises in low back pain reduction [19]. But as related to pain-related disability there was no specific and significant difference between the two interventions as it was also studied that the core stability is no more effective than other physical therapy exercises in the reduction of low back pain but on the contrary, there may be a chance of damaging spine by continuous stress [33].

The previous studies showed that stabilization exercises are equally effective as the other interventions like whole-body vibration for the reduction in chronic low back pain [4, 5]. Stability exercises and movement are dependent on the coordination of all the muscles adjacent to the lumbar spine and not only on the lumbar multifidi and transverse abdominal [34]. As the non-specific low back pain is not a pathology or with no etiology but weakness or imbalance of the muscular control on the lumbar region, as it is a weight-bearing part of the body.

The stability exercises may not have been more effective than other physical exercises, but some studies showed the effectiveness of stabilization exercises over electrotherapeutic modalities used to treat chronic nonspecific low back pain. In treatment groups, patients were treated with specific exercises targeting the activation of the transversus abdominus and multifidus. When proper control was established, patients were advanced to more complex functional tasks targeting the activation of the core muscles. The Control group was treated with detuned short-wave diathermy and placebo ultrasound therapy for 20 minutes for more than 8 treatment sessions for 12 weeks. Results showed a significant decrease in pain measured on NPRS and disability measured on Roland-Morris Disability Questionnaire across the two groups but this reduction was clinically more significant in the treatment group compared to the control group [35].

In this study core stability exercises was more effective than Williams' flexion exercises in the reduction of pain but core stability exercises appear to be somewhat less effective in reducing disability due to the low back pain, these results were maybe because core stability exercises can cause the stress on the spine due to the increased muscle work or due to fatigue as in a study it was concluded that with the continuous testing and the use of complex abdominal hollowing and bracing maneuvers there may potential danger of damaging the spine [33]. This difference may be due to the small sample size of

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this study. Similarly, some studies showed that core stabilization exercises are more effective than other routine physical therapy exercises in the reduction of chronic non-specific low back pain [35].

CONCLUSIONS

The present study indicates that core stability exercises are significantly more effective than Williams' flexion exercises for the reduction in non-specific low back pain. Overall findings show that core stability exercises are superior in producing more significant results except for a reduction in pain-related disability. This study has not shown that Williams' flexion exercises are a statistically better treatment for reduction in pain-related disability according to most of the outcome measurements used in this study.

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